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THE WESTERN MARCH OF THE MONGOLS

Harold Lamb

This is the first of two articles by Mr. Lamb, eminent author and historian, from a chapter entitled "The Book of the Western March" in his volume The Earth Shakers, *published by Doubleday & Company, Inc., Garden City, New York, 1949. Copyright. All rights reserved.—The Editor.*

PART I

IN THE summer of 1236, the new Mongol army mobilized to subjugate the far west region of Europe. Like a gathering avalanche, it moved leisurely at first.

Couriers rode along the route to be followed by the army assembling cattle herds. The road was cleared of obstacles, bridges built over the swifter rivers, and forage stored at regular intervals. Good grassland along the route was marked off, to be kept for the grazing of the *tumans*—the divisions—when they should arrive.

Then ox-drawn wagons creaked along the route, loaded with the shaped timbers of the war engines and munitions. With these went a corps of Chinese engineers, under command of a *k'ung pao*, a master of artillery. With him went sacks of saltpeter and sulphur, the ingredients of the new and still mysterious fire weapon.

When the grass was dying north of the Gobi, the *tumans* assembled from the different *ordus* and route-marched to the west. They had 60 degrees of longitude to cover, and they took their time about it.

The riders of the *tumans* carried complete personal equipment. Each man had one or more remounts. He had a felt cape and sheepskin-lined fur jacket for protection against the cold. For the horses, he had a lariat and picket ropes (which served to attach to the wagons, to draw them through swampy ground or up grades), sacks of barley and a nosebag, a pot for the rider's cooking, a short ax, a bag of salt, wax, a file, and needle and thread.

"The leaders must have the men show them," the *Yasa* of Genghis-Khan commanded, "all the articles to be carried into battle. They must look at everything down to the needle and thread; and if, in this inspection, they come upon a soldier who lacks something, they are to punish him."

Nothing in the mobilization was left to chance. The army went equipped for a march of several years. Heavy tents, for shelter during storms, were carried in the regimental wagon trains. The Mongols never knew the luxury of winter quarters, because they were expected to operate in snow and extreme cold. The steppe-bred horses could forage at need for themselves,

Under Subotai, a master strategist, a Mongol Army overran all Central Russia in 1237-1238. Then, after 2 years in the steppes near the Don, he struck at Kiev and poised his army for the invasion of Middle Europe

digging under light snow with their hoofs to get at grass or moss.

Moreover, the divisions of Subotai's army were made up from the peoples of the forest belt in the mid-west. They were Turks for the most part, Kirghiz and Uighurs, Karluks (Snow Dwellers) and roving Turkomans. There was only a nucleus of Mongols, to stiffen the discipline of the new army.

Few weapons could be seen, while they route-marched. Their chief arm, their bows—the horn-strengthened, double-curved Turkish bow for power, and the short hunting bow for rapid handling from the saddle—were put away, oiled in their cases. The bow case hung low on the left hip of the rider, while the arrow case was on the right side. In action, the warrior could draw and fire his arrows with a slight movement of his hands, with startling rapidity. And he was equipped with three kinds of arrows, ranging from the long, light flight shaft, to the heavy, armor-piercing arrow with sharpened steel head as broad as three fingers. Braced in his stirrups, he could fire a burst of these heavy arrows from the Turkish bow at a gallop. And he could fire to the rear almost as easily.

But on the march, these steel-tipped arrows were carried on the pack animals. The peculiar long Mongol sword, light and slightly curving—a forerunner of the nineteenth century cavalry saber—was carried, oiled, in its leather sheath behind the rider's left shoulder.

Some *Banners*—regiments—were issued light lances with tufts of horsehair below the points, or long hooks, to pull antagonists from the saddle. But these hand weapons were seldom used. They were instruments of the final killing, after arrow fire had broken the resistance of the enemy. They were to the Mongols what the bayonet is to the modern rifleman.

Like the weapons, armor was light and serviceable—strips of oxhide that had been boiled and shaped to the rider's shoulders and body, often with a split apron of leather hanging from his belt over his knees. All leather was lacquered, to keep dampness out. Iron bands strengthened the helmets without making them heavy, while a soft leather drop, studded with iron, protected the neck.

Many of the Banners had armored their horses with leather that guarded the animals' bodies without interfering with movement. Rarely, bronze, and light iron plates shielded the horses' heads. Only the regiments of the *keshak*, the Guard Corps, had shields for defense. And these were intended for use on foot, at night.

Such metal as he had in his equipment the Mongol was expected to keep polished and oiled. His equipment as a whole was planned for actual service, and for one purpose—swift movement, and power in striking during that movement.

A discipline as unyielding as iron held together this mass of men. Death was the penalty for turning back during an action without an order—as it was for failing to give aid to an injured squad mate, and for neglecting to pick up any equipment dropped by a front-file man.

These squads of 10 had been in service together for years. The individual rider knew where his comrades were, and what they would do under all circumstances. The *ung-khan*, or squad leader, was responsible for the welfare of his nine men; the leader of the first squad commanded his hundred, and so on up to the general commanding a *tuman* of 10,000. If the officer of a regiment were killed, the leader of the second hundred would take over his duties without hesitation.

Underlying this principle was the equality of all ranks. Once a campaign had begun, peacetime rank ceased to be. A dispatch rider, on the road, could order a *tuman* commander to dismount, and take his horse. A veteran Guardsman had priv-

ileges above officers of other branches of the service.

"A man of my bodyguard," Genghis-Khan announced, "is superior to a regimental commander of another division. If a regimental commander of the outer line disputes or fights with a *keshaktu*, he shall be punished. Who deserves losing his head shall lose it; who deserves a beating shall have it."

As a rule, the commanders were kinsmen of the ranks serving under them. And Banners were recruited from a single clan—preserving a vestige of the old tribal unit. The officers spent a lifetime with their men. Failure on the part of an officer meant disgrace for the remainder of his life. Anyone from the ranks might succeed him.

Most of the officers now in the army had grown up under the star of victory. "They shielded me," Genghis-Khan had said, "in snow and in rainy nights as well as in battle. My descendants must cherish them as a monument of my making, and not offend them."

A generation of victory had given the ranks unshakable confidence in their leaders. They believed that the spirit-life of Genghis-Khan had entered the standard of the army, with its nine white horsetails. To this confidence was added a sense of safety. The first rule of the army was to bring the ranks back alive. In proportion to the terrible loss of life they had caused, the Mongols had suffered very little. Officers had been trained to be jealous of the safety of their men.

The ranks felt equally confident of the highest command. The mounted bowman in the foremost patrol knew that he was moving in accordance with a definite plan that would destroy the enemy by strategy rather than hand-to-hand fighting.

The strategical skill of the Mongols had been developed in the stress of war. They had learned to keep track of an enemy's movements, while trying to conceal their own. In this maneuvering, they had learned not to depend on commands given by voice, which often cannot be heard in the uproar of moving mounted men. Regiments signaled their movements by raising black or white ensigns—by raising and lowering colored lanterns at night. They used whistling arrows with a hollow pierced head for other signals.

They could hide, at times, their formation behind a drifting smoke screen.

With the armed *tumans* advanced other branches of the service—interpreters to deal with the tangle of languages, Chinese physicians and Mongol *shamans* to minister after their fashion to the sick, and the *darugashis*, the Road Managers, who were to take inventories of the captured areas for the great Khan at Kara-korum. There was even an officer in charge of a lost-and-found department.

And behind the army, cattlemen and carpenters worked to build the corrals and huts of the *yam*, the stations of the horse post that was to link the new west to their homeland.

This host of a hundred thousand men or so (it had not yet been reinforced by Batu's divisions on the Volga) was marching without maps or compasses, or knowledge of what lay at the end of its road, to face many times its number of potential enemies scattered over hundreds of thousands of square miles. Yet it marched with implicit confidence, without thought of defeat.

The mounted columns moved at ease out of the plains, through the passes of the Altai, and into the *taiga*, the dense forest growth of Ibir-Sibir. Snow held the forest, but the stores and cattle awaited the *tumans* along the route. Detachments were thrown out to hunt for game, which grew scarcer as the forest changed to the fir and birch of the west.

By now, all the different contingents of the Right Wing, the *baran-gar*, were on the line of march. Some women rode with

them, in the ox-drawn *kibitkas*, to cook the meat on the march, and to serve the men in this solitude of Sibir where no towns were seen.

At times, in the camping places, they had theatricals to amuse them—actors in false beards and the costumes of legendary kings singing the shrill chants that the tribesmen knew by heart.

Threading through the low summits of the Urals, the columns began to descend into the western steppes. They crossed rivers on the ice, and the hunters went out to the flanks on skis that carried them swiftly over the deep snow. . . . With the melting of the snow, and the first grass, they came on lean horses to the concentration point near the gray Volga.

There they were met and inspected by Subotai and the princes who had spent the winter in the *yurts* (tents) of Batu, methodically going over the reports of the merchants and spies who pieced together for them the picture of the western regions—its thoroughfares and grazing lands, and especially the defenses of its cities and politics of its princes.

"For you will not find one nation at peace with another," the spies announced, "nor one chieftain who does not raid his cousins. Nay, even their archpriest is at war with their great emperor."

Subotai was insatiable in asking about the details of these quarrels. A master of strategy, he knew the importance of keeping an enemy divided.

The End of the Russians

Batu, Khan of the Golden Horde, lived under a cloud. In a way, he had become an exile.

He was a bastard's son, and his father, Juchi, had felt the shame of being born of another father. In his later years, Juchi had kept away from the other brothers, in the western steppes, where some said that he meant to create a dominion of his own. . . . Upon Batu, his son, this shame rested. Ogadai had granted him willingly enough the khanship of the forest people, in the west. And he had given him the nominal command of the new expedition.

Batu, who had kept to the nomad life of his father, had welcomed Subotai and the imperial princes shyly. He had come on foot to greet his mighty guests, and had slaughtered cattle to feast them in his pavilion that shone with cloth-of-gold, on the bank of the Volga, so that men called it the Sira Ordu (the Golden Horde).

He was mild before his guests, uncertain of them when his impetuous cousins teased him. They laughed at him, goodnaturedly—although Kuyuk felt jealous because Batu held the higher command.

"Why, behold," they said, "Batu is splendid. There is no prince anywhere so magnificent as he."

This nickname stuck, and Batu became known among the Mongols as *Sain Khan*, the Splendid Khan. Under his amiability, however, there was a stubborn pride. The son of a bastard, he could never reign as khakhan. Still, he meant to hold power among them.

Especially the madcap sons of Chagatai—a contrast to their father—mocked Batu's good nature. Baidar, and Bouri, a grandson, lived only to hunt and make war. And Kaidu, the fledgling of the lot, Ogadai's grandson, imitated them.

"Batu Sain Khan," he cried, "is a good host. Why, he stuffs us robbers with his best meat. His manners are such that he will never be angered at us."

Kaidu had caught Subotai's eye. The aging master of war saw in the wild youngster the spark of the Mongol genius for warfare. And he instructed him patiently. The one thing Kaidu lacked was patience.

Batu felt that he was beholden to Ogadai, who gave him the command of these great ones. Yet he did not know how he was to make them obey him. He was anxious lest they try to take away his beloved grass-

Concentration, at the end of the summer, 1240, east of the Dnieper. Capture of Kiev and Chernigov, early December. Concentration against middle Europe, January-February 1241 between the headwaters of the Vistula and Halicz. Movement of the four columns began the first of March. The main column with Batu and Subotai forced the Carpathians March 12, and reached the assembly point at Pest on the Danube March 17. The main battles were fought to the west of Sandomir, and near Liegnitz and on the river Sava where the Mongols trapped the army of the Hungarians and their allies. In these six weeks (first of March to middle of April) the Mongol flying columns had crushed four European armies before they could concentrate, and had driven off a fifth—the Bohemians. The next summer concentration was in the Hungarian plain.

lands. Fortunately, with Subotai at his side, he had no need to fear them as yet.

Subotai did not hurry. He and his Mongols were amazed at the vast extent of the Russian plain and the richness of the grass. Wild grain sprang up miraculously from the black earth. Here was an ideal land for the horse nomads. And they understood why Juchi and Batu had clung so persistently to these western steppes.

In that early summer on the Volga, Subotai did not move farther west. His first thought was to clear his flanks. At the same time, he welded together the tribal regiments that served Batu—the Bashkirs of the Turgai region and the Kirghiz of Sibir—stiffening them with the steel of Mongol discipline. In doing so, he thrashed the Bulgars on the upper Volga—destroying their age-old trading center of Bolghar.

To the south, he sent Mangu, to break up the wild Kipchaks.

Mangu and his men rode by the stone *babas*, the mark of another race upon the steppes, indifferently. By now, he and his Mongols were accustomed to meeting the images of strange gods. The Kipchaks gave way before him as foxes take shelter at the coming of a wolf. Some of the nomad Turkish tribesmen submitted to the Mongol yoke, but most of them fled westward, toward the Dnieper. Mangu let them go, and turned back to hunt down the bandits that had infested the lower Volga.

Not until the first heavy snow covered the steppe did Subotai move against the Russians.

For it was a law laid down by Genghis-Khan that Mongol armies of invasion, emerging from the steppes, should advance by stages. When the conflict was ended in the first zone, the survivors there were rounded up. With their horse herds, the men were conscripted and led or driven on by the *ordus*, into the next zone.

Here the refugees were used as a human screen by the Mongols, at need, in an attack. By this, the lives of the Mongol contingents were protected. And in the first zone, at their rear, no mass of men remained to rise in rebellion. A few guard posts scattered along the roads could maintain order—aided by the terror of the invasion.

In this way, Subotai herded the remnants of Bulgars and the Volga men into mounted bands, trained them, and led them into Russia. Before that, he sent envoys to demand submission from the Russian princes, as the price of peace.

The strange Mongol emissaries, appearing at the gates of the towns, were put to death by the Russians.

As if enraged beyond caution by this, Subotai struck into the northwest straight toward the larger Russian cities. Apparently, he was doing a senseless thing—turning aside from the open steppes, where the nomad raids had gone before, into the forested regions. And he attacked in December 1237, when the cold was bitter.

Actually, the Mongol leaders had reasons of their own for doing this. By striking their first blow against the stronger region, where the Russians might have defended themselves, given time, in the forests, the Mongols cleared this difficult ground of defenders before the Russians realized their purpose. The open steppes were a thoroughfare for the nomads; they let the south wait.

And by moving in midwinter, they could cross rivers on the ice. The Russians would not expect them, and would be collected, with stores of grain and meat, in the towns. As for the forests, the Mongols cut a way through, wide enough for three carts to pass abreast, at need.

"They advanced," the chroniclers say, "as if driving game in a hunt."

The Russians had settled down for the winter behind the wooden walls of their cities and hamlets. They were a turbulent, warlike people—their princes descendants of the Variags (Swedes) of the north. Their cities of the fertile Riazan region

had thrived from the slave and fur trade, and they carried on unending feuds. Their log walls had been sufficient to check the raids of Kipchaks and Bulgars, and the Slavs had the foolish hardihood of brave men who had never been far from home.

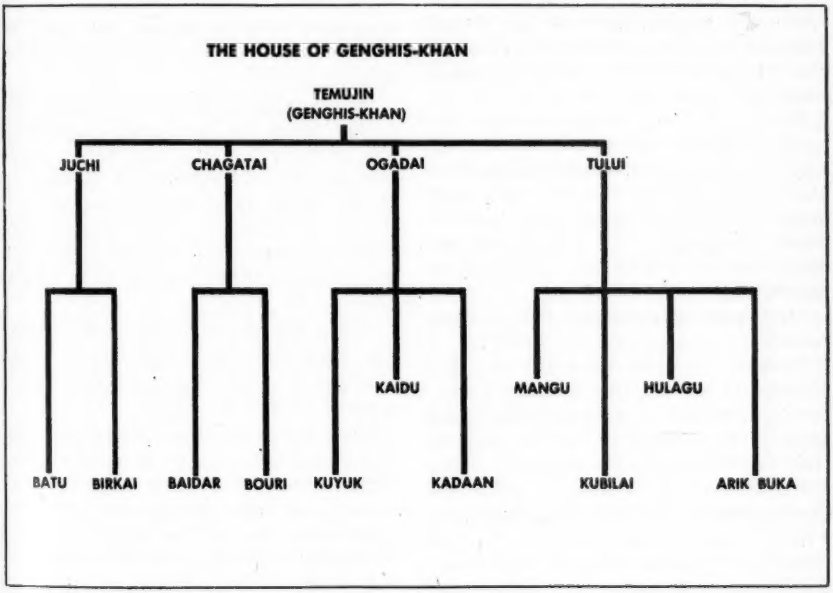
They were warriors on horseback, rather than horsemen. They rode in crude iron armor, followed by the mass of the *smerdi*, the stinking ones, the Finns and armed peasantry on foot. Heretofore, they had fought hand to hand with swords, and they knew no other method of warfare.

They had had a warning of the Mongol peril, when the army of the southern princes was annihilated by Subotai on a raid at the river Khalka in 1222. This warning went unheeded.

An eclipse of the sun, at the end of that summer, caused them more concern. "There was a sign in the sun on the third day of August," the monks of Novgorod wrote in their chronicle. "The sign was of this kind; there was a darkness on the western side of the sun; it became like a moon of 5 nights."

Along the frozen rivers, the Mongol columns moved north, sending envoys ahead to bid the Russians submit to the great Khan and pay a tithe.

"They sent their emissaries," the Novgorod chronicle relates, "to the *Kniazes* of Riazan, a sorceress and two men with her, demanding from them one tenth of everything; of men and *Kniazes* and horses—of everything, one tenth. And the *Kniazes*, without letting them into their towns, went out to meet them, saying, 'Only when none of us are left alive, then all will be yours.' And the *Kniazes* (the Noble-born) of Riazan sent to Yuri of Vladimir asking for help, or himself to come. But



Yuri neither went himself nor listened to the request of the *Kniazes* of Riazan, but he himself wished to make war separately.

"But it was too late to oppose the wrath of God."

The Russian princes, seemingly incapable of understanding their danger, would not move to aid each other at first. When they did move, sluggishly through the snow, they had no knowledge of what was going on elsewhere. The Mongol mounted divisions swept over them, piecemeal.

The wooden walls of Riazan crumbled under the bombardment of the Mongol siege engines. Before the Russians realized that the walls had failed, the Mongol horsemen were in the city.

Riazan became a slaughterhouse. Men were hunted through the red snow of the alleys, and thrust on stakes to wriggle out their lives. Priests who had shut themselves up in the churches were exterminated like sheep. The women who had sought sanctuary with them were violated and killed.

"No eyes," a chronicler mourns, "remained open to weep for the dead."

In swift succession, Suzdal, Rostov, and Yaroslavl were stormed and destroyed—the Mongol columns following the frozen rivers from citadel to citadel. Moscow, then a small town on the steep cliff (today the height of the Kremlin) where the Moskva River joins the Neglinnaya, was burned. "And the men of Moscow," the Novgorod chronicle explains, "ran away, having seen nothing."

Along the Kolomenka River, a Russian army suffered "a bitter and violent death."

Vladimir, the largest stronghold of fertile central Russia, was broken into while its princely families were crowding into the Church of the Holy Mother of God, barricading themselves in to gain time to have themselves shorn like the monks and taken into the monastic order in these last moments of their lives. Crowded into the sacristy of the church, they were burned.

The Grand Prince Yuri, who should have rallied his vassals in time to meet the Mongols, was not even in the city. He was approaching when he heard that Vladimir had been destroyed.

"And Kniaz Yuri," the chronicle adds, "sent out Dorozh to scout with 3,000 men; and Dorozh came running, and said: 'They have surrounded us, Kniaz.' And the prince began to muster his forces about him, when behold, the Tartars came up suddenly, and the Kniaz, without having been able to do anything, fled. And it happened when he reached the river Sit, they overtook him and there he ended his life."

This tale was repeated elsewhere. The feudal levies of the princes, marching out of their log and dirt fortifications, moving slowly through the snow, were struck before they realized they were in danger by a fire power that crippled them from a distance. The Mongols divided into two columns, and took cities, as it were, in their stride.

"Thus did God by means of these men," the chronicle adds, "take from us our strength, and put into us perplexity, and a dread as if of thunder."

The Russians were valiant enough. Their best men died, surrounded, fighting hand to hand. The Mongols let the fugitives go, as their custom was, to be followed later through the forest paths and eliminated, or added to the growing bands of slaves. There was no escaping the swift-moving detachments. The heavy Russian horses were outpaced by the steppe-bred mustangs.

In the month of February, 12 walled cities were obliterated. In the short space between December and the end of March, the free peoples of central Russia vanished. And the sturdy and turbulent independence of the Variag-governed Slavs ceased to be. The word Slav had meant "Glorious." Now, the territory of the Slavs became a

vast prison zone, and it was destined to be that for a long time to come.

Another change took place. The destruction of the city-communities drove the survivors out into the smaller rural hamlets, where they turned by necessity to agriculture to sustain their lives. The animal-like *smerdis* raised food for the children of the slain warriors.

The snow was melting and the spring rains setting in when Batu's column moved north through the pine and birch woodlands toward the Baltic and Novgorod the Great.

Northern Russia escaped by good luck. The powerful merchants' republic of Novgorod had made no attempt to aid the cities in the Riazan region—perhaps because the merchants were willing to see their rivals destroyed, more probably because they had no inclination to march out of their own city-state of breweries, bees, and forests.

By the edge of Lake Llmen, near the Baltic, the free men of Novgorod had carried on a prosperous trade with the German Hanseatic ports, quarreling and fighting sturdy little duels with the Swedes and the Teutonic Knights who competed with them for the northern fur trade. (From the edge of the Baltic south, the militant Germans were pressing against the Slavs, with the smaller peoples, Poles, and pagan Lithuanians, caught between the greater masses. The Prussians were at that time savages, the lawful prey, for slaughter or conversion, of the Teutonic Knights. This centuries-long conflict of Germans and Slavs for possession of the eastern marshes of Europe was interrupted rudely by the Mongols.)

Batu's division made toward Novgorod from ruined Percyaslavl. By then, the snow had gone and the invading horsemen found themselves in a labyrinth of swamps and dense forest growth. By rare fortune—for the Novgorodians—it rained almost continually that spring and summer. The wet, and lack of grazing, worked hardship on the Mongol horsemen accustomed to the almost rainless prairies of high Asia. Before they sighted Lake Llmen, they turned back, wearied by the constant rain, within 60 miles of wealthy Novgorod.

Batu turned back by Subotai's advice. That experienced general realized that he had forced his divisions through a hard campaign in the midwinter cold. Their horses were in bad condition. So he turned all the units of his army to the south, leaving only guard detachments in the ravaged central Russia. Now he had need of the good grazing in the southern steppes.

Moreover, the Mongols had discovered that the Slavs of the cities were unlike the Asiatic nomads. They would not or could not be drafted into the mounted regiments of the *Ordu*, to learn the Mongol method of warfare. They were useful only as sappers and laborers. The Mongols, therefore, would have to make their attack on the next zone of resistance without Russian conscripts, and Subotai, the ever-cautious, took time to prepare for the next move.

It took him longer than he expected.

In that summer of 1238, he followed the grass south, putting his horses in condition. Curiously, the Mongols explored the fertile steppes around the Black Sea. Here, where the grasslands stretched to the salt inlets, they discovered an ideal coast, sun-warmed, suitable for cattle.

Some of them investigated the Krimea and came face to face with a strange variety of Christians. These spoke an unknown tongue, they wore no boots, and they lived by barter, like the Arab caravan merchants. They proved to be Venetians, and since they did not appear in arms against the Mongols, they were not massacred. Instead, they bought Russian slaves and loot from the nomads.

At the same time, Subotai's detachments penetrated the heights of the Caucasus far enough to establish contact with the other

Mongol army, of north Persia. The two commands, meeting after 4 years, exchanged information and parted.

The Mongols were putting central Russia in order, methodically as usual. The *darugashi*, the governor for the Khakhan, estimated the yield of grain in the southern black-earth region, and the value of the furs—the sable, miniver, black and silver fox, and beaver—that came out of the north. These, and hides and tallow, with the silver of the Ural region, and the human beings to be sold as slaves or kept to pay taxes, made up the wealth of Russia.

Since he found almost no coined money in Russia, the *darugashi* planned to have his new subjects pay a tax in beasts of the five kinds—sheep, horses, cows, oxen, and hogs. Already he had begun, with his Uighur and Chinese secretaries, the census of human souls, the building of granaries along the courier roads that did not exist as yet. He had to establish contact between this new empire of Batu and the court of the Khakhan in the far east. . .

While this was going on, Subotai was delayed by something he could not prevent—friction between the members of the Golden Family. They had advanced nearly a thousand miles from the old frontier of the Urals, they had won most of the Russian plain for Batu. Batu's golden tents and his numerous wives accompanied the army. It seemed to Kuyuk and to the sons of Chagatai that Batu had enough of an empire already. But Subotai, the inflexible, would hear of no halt in the march toward Europe. Nor would Kuyuk, the unyielding, consent to act as divisional general for the Sain Khan, the son of a bastard.

Mangu, on the other hand—on Siyurkuktiti's advice—was kind to Batu. And Mangu had been gaining victories in the fertile south. Mangu had conscripted a division of the strong Kipchak Turks—although the greater part of the Kipchaks, some 40,000 tents, had fled westward with their chieftain, Kutyan, headlong across the rivers, up to the Hungarian plain. This aged Kutyan knew the Mongols of old, and he put as much space between them and his people as he could.

This escape of a powerful enemy, who was certain to warn Europe of the coming attack by the Mongols, irked Subotai. But Kuyuk and the unruly princes would pay no attention to his protests. They wanted to be back in Kara-korum with the ailing Ogadai. Batu, in this crisis, called for a *kuriltai* (gathering) of the leaders of the army, only to be mocked by Kuyuk and his sympathizers. And Batu sent a message of protest to the Khakhan in Kara-korum.

"O Khakhan, my uncle! By the power of Heaven," he wrote, "we have overcome the 11 nations. When the armies turned back, a feast was held for all the princes. I am the eldest, so I drank one or two cups of wine before the others.

"Then were Kuyuk and Bouri angered. They rose from the feast and went out, mounting their horses. They abused me. Bouri cried out, 'Batu is in no way superior to me—why does he drink before I drink? He is no more than an old woman with a beard. With one kick I could knock him down and roll him over.'

"Kuyuk said, 'Nay, he is an old woman with a sword and armor. I shall order him to be beaten with a stick.'

"And another one called out to fasten a wooden tail to my body behind. Such was the speech of these princes when, after the war with the different peoples of the west, we gathered to deliberate upon important matters. And we had to break up without discussing affairs at all. Such is my message to you, O Khakhan, my uncle."

After months, the riders of the horse post brought a reply from Ogadai, indignant at this family dispute which held up the work of conquest. The Khakhan censured his son Kuyuk severely, adding that Bouri and Baidar would be judged by Chagatai. "As for you," Ogadai reminded

Batu, "do not boast so much of your victories. They were gained by Subotai."

More than that, Ogadai recalled Kuyuk and Bouri and the others. They left with their followers for the long trek back to the Gobi. But, being in no mood to be called to account before Ogadai, they went at a foot pace, hunting on the way.

Batu, worried, would have followed. Mangu had heard from his mother that Ogadai had fallen sick, and the master of the Golden Horde wanted to protect his own interests—at least to return to his headquarters on the Volga. "I cannot keep you from going," Subotai said to him, "yet I will not turn aside until I have watered my horse in the Danube."

Knowing that his own men would not follow him from the war, Batu had to stay with the 60-year-old general. But it seemed to him that they risked defeat by advancing. The immense area behind them held within it peoples who had been stunned but not destroyed by the Mongol inroads. The detachments Subotai had left to guard their communications, perhaps 50,000 men, did not number more than a fraction of the surviving populations. He and Subotai could not have mustered more than 90,000 men for a new campaign.

Besides, after the flight of the Kipchaks, Europe would be warned, and armed and ready. For 2 years, the Mongols had delayed in the steppes north of the Don.

Subotai, however, would not listen to objections.

The Court of the Golden Heads

Subotai struck again in December 1240. This time against elder Russia, where trading centers had grown up around Kiev, the mother of cities. For centuries here, the southern Slavs had been in contact with Byzantine culture—the Dnieper and the Black Sea being the way to Constantinople. But here in the southwest, the prince was at feud with his rivals. And, as in the devastated north, their neighbors gave them no aid.

Mangu and Batu led this new invasion across the frozen Dnieper. The worried master of the Golden Horde and the silent son of Tului had become fast friends. And Subotai could not trust Batu to lead without a wiser head beside him.

They were struck by the first sight of Kiev, with its gilded domes and white walls reflected in the river. And they christened it the Court of the Golden Heads.

Mangu had sent the Kievans the usual summons to submit, adding, "If you do otherwise, we know not what will happen. Only God knows."

Recklessly, the city men slew the Mongol envoys bringing the summons, and closed their gates when the first horsemen appeared with the ruins of the river hamlets smoking behind them.

"See how the little pigs," the Mongols laughed, "have gathered in their pen to be put to death."

The capture of Kiev was followed by its utter devastation. The Russians ran from the wall into the churches, and the flat roof of one, crowded with people, caved in on the frantic multitude beneath. The great Church of the Tithe was torn apart by the Mongols—only heaped-up stones remaining on its site. The Byzantine mosaics and the treasures of the sanctuaries almost vanished. When Kiev was at last rebuilt, it was only a shadow, the chroniclers say, of the lost city.

The Grand Prince Michael escaped toward Poland, but the charred bodies of his people lay unburied in the dismantled walls, until the stench of them drove human beings from the place.

After the fleeing nobles, the Mongols followed, driving the Kipchaks and Slavs ahead of them. Wives of the *boyarins* (aristocrats) who had never worked with their hands labored at grinding grain and watering the Mongols' horses. "It was strange," a chronicle relates, "to see those

who had commanded servants doing the work of servants."

The pursuit of the Mongols reached the barrier of the Carpathian Mountains, and halted for a few days to rest the horses.

Batu had a fondness for the Russians, and wished to spare them. He admired one of the first captives, Oleg the Handsome, whose blue eyes and long yellow hair held something of a woman's charm. When Batu tried to caress Oleg, the Russian thrust him away, and in time Batu killed him. At the sack of Kiev, he had spared the bold Dmitri, called the Galician. Dmitri became his intimate, and urged him to have nothing to do with the western peoples.

West of the Carpathians, Dmitri said, militant barbarians would be met with—people of the forests and the cities; proud kings and bishops who were no less than kings—hosts of mail-clad knights and men-at-arms trained in war. There monasteries and churches were to be seen as formidable as castles. Swift rivers now filling with the spring thaw, and dangerous marshlands, and towns strengthened by citadels—all these would be obstacles to the Mongol horsemen.

Moreover, the inhabitants of this middle Europe were accustomed to make war for the glory of their God—Slavs beyond the Dnieper, Poles, dour Croats and Magyars, Bohemians, Hungarians, aided by the Teutonic Knights and French Templars who had come to serve against the invading pagans. And behind them, the twin powers of the German Emperor and the Church of Rome, then engaged in a war of their own.

(The Mongols encamped outside the barrier of the Carpathians were confronted by what was until recently Poland, Rumania, Hungary, and Jugoslavia, with the southern Germans, Austrians, and Czechs. And behind these the twin powers of the Third Reich and Italy.)

These Europeans had had ample warning of the Mongols' approach. They were mustering their armed strength as far away as Bohemia, in the midwinter snows. But they were moving slowly, not yet united. They heard that a Mongol raiding detachment had penetrated as far as Sandomir in Polish territory, to seize captives for information. Kutyan's Kipchak tribesmen had described the Mongols and their method of warfare to the King of Hungary. The Kipchaks were in such fear of the Mongols that they consented to be baptized en mass by the Hungarians, to join the army of that strong nation.

Moreover, Russian refugees, thronging across the Galician plains, had come into the Polish courts with tales of the sack of Kiev. These tales grew in the telling, until the Europeans assured each other that a horde of demons was on the march toward them. A certain Ivo of Narbonne wrote down gravely that these pagans had the heads of dogs, and that after they had fed upon the bodies of the dead, vultures would not touch the bones. Young and lovely women, Ivo added, after being ravished by the dog-headed Mongols, had their breasts torn open and were kept for dainty eating thereafter.

A Friar Julian had made two journeys into Russia, and had written to his bishop, Salvius of Perouse, that the Mongols would move against Germany, and that they talked of conquering Rome and the lands beyond.

But of the true nature of the invaders, of their method of warfare and their purpose, the Europeans were ignorant. Like the Russians, they trusted blindly in their ability to defeat any numbers of pagans.

They paid no attention to the formal letter Batu wrote to Bela, king of the Hungarians. For one reason, it was written in the Uighur script and no one at the court could read it.

But the Kipchaks could read it, and the same Friar Julian had it read to him. It had a consequence amusing as we look back on it but grim enough at the time. It was, in fact, a Mongol trick.

"I am Sain," it began, "the messenger of the Lord of the Sky (the Khakhan) who has authority over the earth. He has given me power to raise up those who submit to me and to crush those who defy me. I am surprised that you, King of Hungary, have paid no heed to the envoys I sent to you. . . . It may anger you to submit, yet it is best to do so."

So far, the routine summons to surrender to Mongol rule. Now follows the barb:

"Word has come to me that you have taken the Kipchak, our servants, under your protection. Cease harboring them, or you will make of me an enemy because of them. They, who have no houses and dwell in tents, will find it easy to escape. But you who dwell in houses within towns—how can you escape from me?"

Now Batu had interpreters enough about him—a little later he even sent a message by a captured Englishman who spoke seven languages. He could have had the letter written in Russian or Hungarian. Instead he used a script that only the Kipchaks could read. (And this was not by accident, because after the campaign he wrought more deviltry by letter when he got possession of Bela's state seal.)

The natural consequence was that the Hungarians suspected he was sending a secret message to the Kipchak Khan, who actually desired nothing more than to stand with the Hungarians against the Mongols. This led to the rumor that the Mongols had sent the Turkish Kipchaks on ahead, to betray the Hungarians. Then it was discovered that the letter stated that the tribesmen would escape, while the Europeans who dwelt in houses would be exterminated.

A worthy Austrian archduke who had volunteered for the campaign was impelled to kill the Khan of the Kipchaks and throw his head out of a window. The net result was that the Kipchaks, who would have been valuable allies, fled to the mountains and raided the Hungarians like wolves.

Today, time and space continue to be factors influencing military thinking, but an entirely new concept of those factors is demanded of the military leader. Where the commander of old thought in terms of months, then days and, finally in the last war, hours, the commander of the future must think in terms of minutes and seconds.

Former Secretary of War Robert P. Patterson

Jan 1950

Occasionally in battle comes a supreme test of leadership. This occurs at that fleeting moment in combat when the enemy attack first falters. For the urge then comes to breathe relief and to relax. The temptation to prolong the respite from anxiety is almost overwhelming. But seizure of the initiative is then most important, and the momentum there gained has meant victory—indecision has prolonged conflict.

General Omar N. Bradley

THE BATTLE OF NANCY

A Double Envelopment

Lieutenant Colonel Harry Balish, *Infantry*
Instructor, Command and General Staff College

COMBAT situations confronting corps commanders of World War II presented few opportunities for employing the double envelopment as the scheme of maneuver. The situation facing XII Corps at Nancy, France, early in September of 1944, however, did offer such an opportunity. The XII Corps Commander, quickly discerning that the conditions favored a pincer movement, executed a double envelopment and achieved decisive results.

General Situation

The occasion for the employment of the double envelopment by XII Corps resulted from a series of incidents which occurred during the pursuit of the German forces eastward across France. The breakthrough at St. Lô by the First Army, and the eruption of the Third Army from Avranches, set the stage for the German withdrawal to the east. Early in August, the Third Army, attacking in conjunction with the First Army on its left (north) flank, began a sweep which ended late in September.

XII Corps, as part of the Third Army, began its part in the liberation of France after its concentration southeast of Le Mans, during the period 12-15 August. Within 16 days, the Corps advanced some 250 miles, crossing five major rivers. These rivers were successfully crossed by the use of tactics which utilized speed and surprise. By 31 August, the Corps had seized and secured a bridgehead east of the Marne River extending from Chalons-Sur-Marne to Vitry Le Francois (Map 1).

The next 2 days saw XII Corps across the Meuse River and established in force at Commercy. At this time, the Corps was disposed as shown in Maps 2 and 3. Note that the attacking elements of the Corps were one infantry division (80th Infantry Division) and elements of the 4th Armored Division. The 35th Infantry Division was employed to protect the Army's south flank. The Corps at this time was operating on a front of some 30 miles (Map 2).

The Commercy bridgehead was the springboard for the capture of Nancy.

Before going into the battle of Nancy, it is well to relate a few facts which had an important bearing thereon. The advance of XII Corps, following its concentration at Le Mans, entailed only light casualties and was extremely rapid. By the end of August, however, the Corps was forced to slow down. Gasoline and artillery ammunition were in short supply and replenishment was far below the requirements of the Corps. Consequently, the armored units and most of the infantry units were partially immobilized. The advent of inclement weather early in September was also a deterrent to rapid advance. Finally, the speed of the XII Corps sweep militated against the collection of adequate and accurate information of the enemy.

The Terrain and the Enemy

The terrain between the Meuse River and the Moselle River consists of a series of wooded ridges and open valleys cut by numerous streams south of Toul and by lakes north of the town. The valleys are

controlled by the high ground at Toul and Pont-St-Vincent. The Moselle River valley is dominated by the high ground east of the River. The Foret de Haye, the natural approach to Nancy, is a heavily wooded plateau protected by the loop of the Moselle River and the old forts strategically situated to guard this approach. East of Nancy, the country is generally flat and poorly drained. Several dams and catchment basins in this area form ponds and lakes. Large sections of this area can be flooded by breaching the dams.

The German forces opposing XII Corps were disposed generally as shown in Map 3. It was estimated that the Corps was opposed by 24,000 men actually engaged, and 12,000 men in reserve, but these figures proved to be highly conservative. The enforced slow-down of XII Corps in late August permitted the disorganized and fleeing enemy to halt and entrench behind the barrier of the Moselle River. It also permitted reinforcements from Italy and Germany to occupy positions along the Moselle River from Pont-A-Mousson in the north to Epinal (Map 2) in the south. Strongpoints were established west of Pont-A-Mousson, Toul, and Epinal.

There were few opportunities in World War II for a corps to execute a double envelopment, but the attack toward Nancy was one instance where such a maneuver was feasible, and the results were decisive

The Operation

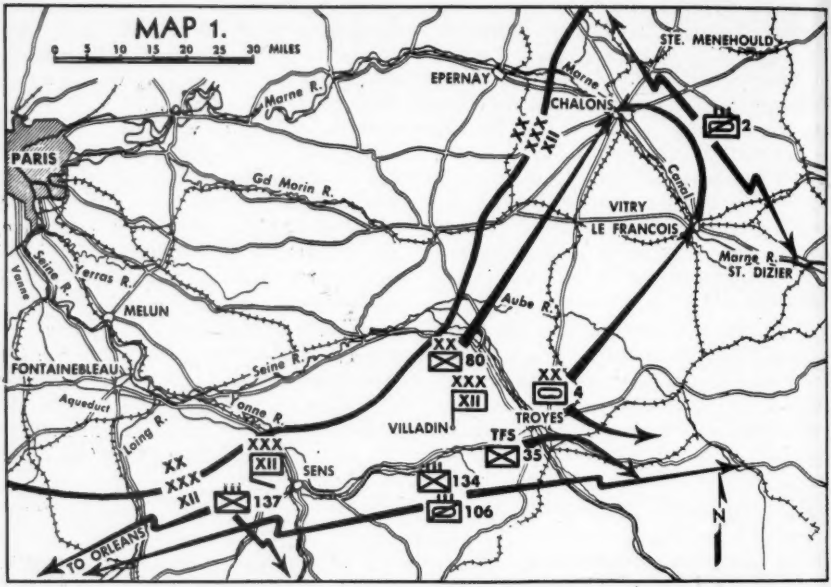
By 4 September, XII Corps was able to obtain sufficient gasoline to resume the advance. The Corps Commander, therefore, directed the 80th Infantry Division to conduct a "reconnaissance in force" east of the Moselle River. The attack, if successful, would be exploited and would precede a general advance to seize a crossing over the Rhine River at Mannheim. The plan provided for a thrust by elements of the 80th Infantry Division to establish a crossing point at Pont-A-Mousson (historically a crossing site since the days of the Romans). The crossing was to be exploited by Combat Command A of the 4th Armored Division, which would attack southward and envelop Nancy from the north. A second task force from the 80th Infantry Division, supported by Combat Command B of the 4th Armored Division, was to establish a bridgehead at Toul and attack through the Foret de Haye in order to seize Nancy from the west.

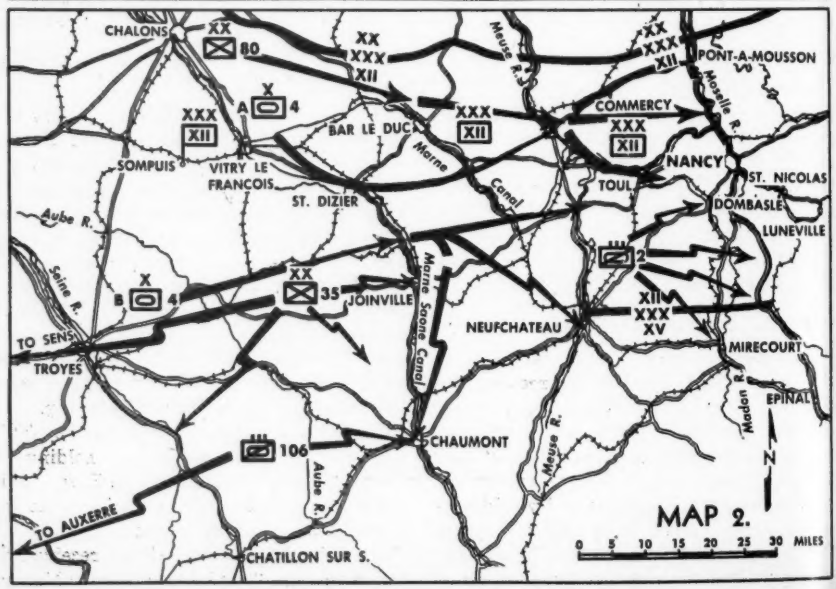
The 35th Division, which had been protecting the Army's south flank since the capture of Orleans (15-16 August), was to continue its mission. At this time, the 35th Division was protecting more than 100 miles of vulnerable flank (see Maps 2 and 3).

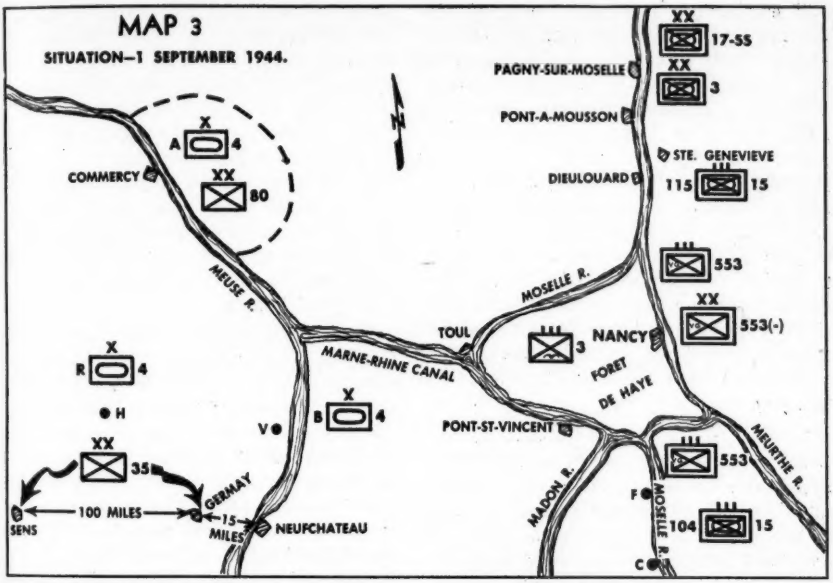
The attack of the 80th Infantry Division at Pont-A-Mousson was launched early on the morning of 5 September. The attack was necessarily made without benefit of thorough reconnaissance and with minimum artillery support. Throughout the day, the division attempted, without success, to establish a bridgehead. Small groups which succeeded in crossing the river were repulsed by strong enemy counterattacks. That night, the 80th Division regrouped and again attacked. A small force succeeded in crossing the River but was driven back the next morning.

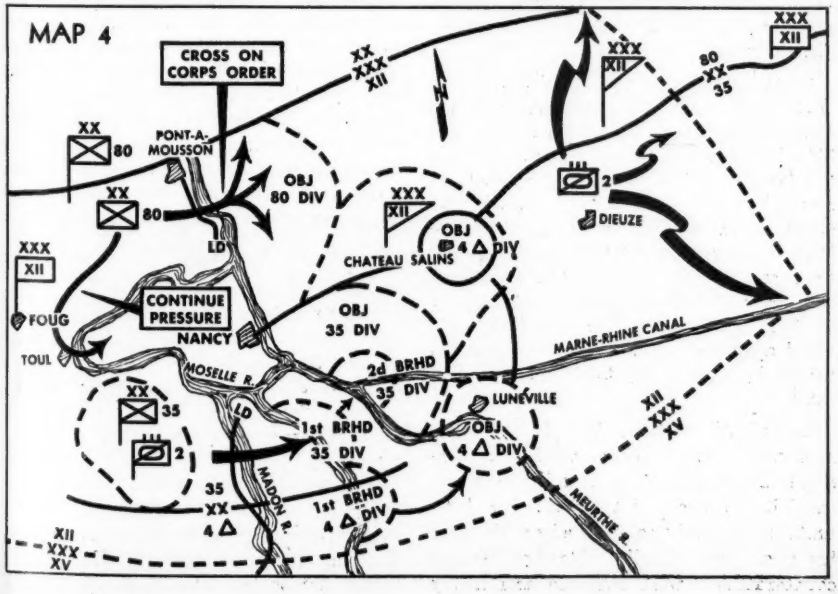
The attack of the Task Force at Toul succeeded in establishing and holding a bridgehead east of the Moselle River. All attempts to advance through the Foret de Haye, however, were unsuccessful.

On 5 September, XII Corps received a directive from Third Army to seize Nancy


MAP 1.
0 5 10 15 20 25 30 MILES
PARIS
Marne R.
EPERNAY
Marne
CHALONS
STE. MENEHOULD
XX XXX XII
2
Gd Morin R.
Canal
VITRY
LE FRANCOIS
Marne R.
ST. DIZIER
Seine R.
Yerres R.
Yonne
MELUN
Aube R.
XX 80
XXX XII
XX 4
FONTAINEBLEAU
Seine R.
Aqueduct
Yonne R.
Loing R.
VILLADIN
TROYES
TFS 35
XXX XII
XX XXX XII
SENS
134
137
106
TO ORLEANS
N


CHALONS
XX 80
XX XXX XII
Meuse R.
XX XXX XII
PONT-A-MOUSSON
Moselle R.
X A 4
XXX XII
BAR LE DUC
XXX XII
COMMERCY
XXX XII
SOMPUIS
VITRY LE FRANCOIS
Marne
NANCY
ST. NICOLAS
ST. DIZIER
Canal
TOUL
DOMBASLE
LUNEVILLE
Aube R.
2
Seine R.
X B 4
XX 35
JOINVILLE
Marne Saone Canal
XII XXX XV
NEUFCHATEAU
TO SENS
TROYES
MIRECOURT
Madon
EPINAL
106
CHAUMONT
Meuse R.
Aube R.
TO AUXERRE
CHATILLON SUR S.
MAP 2.
0 5 10 15 20 25 30 MILES
N


MAP 3
SITUATION—1 SEPTEMBER 1944.
PAGNY-SUR-MOSELLE
PONT-A-MOUSSON
DIEULOUARD
STE. GENEVIEVE
COMMERCY
MEUSE R.
MOSELLE R.
TOUL
NANCY
MARNE-RHINE CANAL
FORET DE HAYE
PONT-ST-VINCENT
MEURTHE R.
MADON R.
100 MILES
15 MILES
GERMAY
NEUFCHATEAU
SENS
17-55
3
115
15
553
553(-)
104


MAP 4
CROSS ON CORPS ORDER
PONT-A-MOUSSON
OBJ 80 DIV
LD
CONTINUE PRESSURE
NANCY
FOUG
TOUL
OBJ 35 DIV
CHATEAU SALINS
OBJ 4 Δ DIV
DIEUZE
MARNE-RHINE CANAL
MOSELLE R.
2d BRHD 35 DIV
LUNEVILLE
1st BRHD 35 DIV
1st BRHD 4 Δ DIV
MADON R.
MEURTHE R.

and establish a bridgehead east of the Moselle River. This directive, and the inability of the 80th Division to advance on 5-6 September, caused the Corps Commander to make new plans for accomplishing his mission. Two important developments occurred at this time which permitted the Corps to employ the 35th Infantry Division in an assault role. First, the Seventh Army, attacking north from southern France, had advanced sufficiently to make a juncture of the Third and Seventh Armies imminent. Second, XV Corps was assigned to the Third Army and given the mission of protecting the Army's south flank, thus relieving XII Corps of this responsibility.

In view of the changed situation, XII Corps devised a plan which was to result in a double envelopment of Nancy and the establishment of a secure bridgehead east of the Moselle River. The plan envisaged an attack by the 35th Division south of Nancy, a holding force at Toul, and an attack by the 80th Division north of Nancy (see Map 4).

Time for the attack of the 35th Division was set at 110500 September, with the Madon River as the line of departure. The 80th Division was to be prepared to cross the Moselle on Corps order. The 4th Armored Division was ordered to attack with Combat Command B on the right of the 35th Division, Combat Command A being prepared to cross north of the 80th Division or to exploit any success obtained by the 80th Division. The Corps artillery provided a northern and a southern support group by employing two fire direction centers.

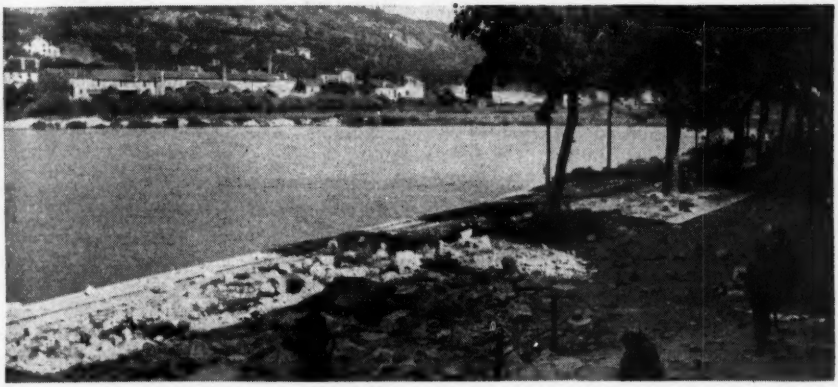
The attack by the 35th Infantry Division and Combat Command B, 4th Armored Division, on 11 September was successful. By noon of the next day, both units were firmly established on the east bank of the Moselle. Strong German counterattacks were repulsed and heavy losses inflicted upon the enemy. Late afternoon of the 12th found the Germans retreating to the northeast, closely pursued by the attacking forces who were assisted by combat planes of the XIX Tactical Air Force. Three days later (15 September), all elements of XII Corps south of Nancy had either crossed the Marne-Rhine Canal or had closed to the near bank, Map 4). This action succeeded in cutting the Nancy-Lunéville Road, thereby denying this route of retreat to the German forces in the vicinity of Nancy.

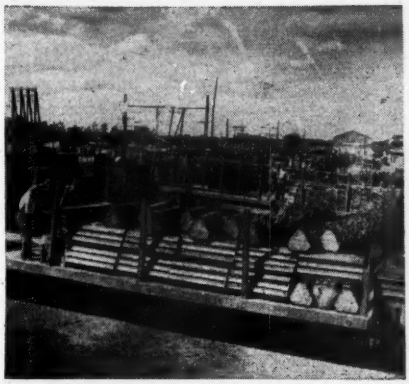
The success of the 35th Division and Combat Command B on 11-12 September dictated a prompt effort to cross the Moselle River north of Nancy. Consequently, the Corps Commander directed the 80th Division to attack early on the morning of 12 September in the vicinity of Dieulouard. The Division advanced against surprisingly light resistance and by 0800 had seized the heights in the vicinity of Ste. Genevieve. A heavy ponton bridge was constructed by nightfall, and the remainder of the Division began moving into the bridgehead. The next morning, the enemy made a determined effort to destroy the 80th Division bridgehead and succeeded in advancing within 100 yards of the bridge site before being repulsed. Not until late afternoon was the original perimeter of the bridgehead restored.

Armored Action

The 4th Armored Division played an important role in the encirclement of Nancy. As stated above, Combat Command B crossed the Moselle River south of Nancy and severed the Nancy-Lunéville Road.

On 11 September, Combat Command A attempted to cross the Moselle River in the vicinity of Pagny-Sur-Moselle. This attempt failed due to a lack of adequate bridging and equipment. The success of the 80th Division on the morning of the 12th, and the early construction of a heavy bridge across the Moselle at Dieulouard,





Above, men of the 317th Regiment, 80th Infantry Division, reach the bank of the Moselle River on 5 September 1944, under German fire from the far heights. Right, ammunition being unloaded at Le Mans, France, in August 1944; XII Corps concentrated southeast of Le Mans a few days before this picture was taken. Below, the mayor of Nancy, France, thanks personnel of the 35th Infantry Division for their part in the liberation of the city on 15 September 1944; the city fell as a result of a double envelopment executed by XII Corps, composed of the 35th and 80th Infantry Divisions and the 4th Armored Division.—US Army photos.

provided a means for Combat Command A to cross the River.

When the leading elements of Combat Command A arrived at the 80th Division bridge site on the morning of the 13th, the German counterattack was threatening the 80th Division bridgehead. The Corps Commander, who was present at the bridge site, had to make a quick decision. If he permitted Combat Command A to cross, the bridgehead might be saved and success exploited; however, he ran the risk of losing part of his armor, for there was no guarantee that the bridgehead would hold. A failure to commit the armor could well result in the loss of the bridgehead. After a conference with his subordinate commanders at the bridge site, he ordered Combat Command A to cross the bridge.

Thus began one of the finest armored actions of the war. Combat Command A crossed the river, crashed through the German counterattacking forces, drove the Germans from the high ground at Ste. Genevieve, and advanced rapidly to the east. That night Combat Command A "coiled up" 3 miles west of its original objective of Chateau Salins. On 14 September, Combat Command A drove south and by nightfall contacted Combat Command B on the Marne-Rhine Canal. The juncture of the two armored columns closed the pincer on Nancy.

The Capture of Nancy

While the two divisions were crossing the Moselle River on 11-12 September, the Corps Commander organized Task Force *Sebree*. This force, composed of elements of the 35th and 80th Infantry Divisions, plus supporting tanks and artillery, was ordered to advance through the Foret de Haye and to attack Nancy from the west.

On 14 September, patrols from Task Force *Sebree* entered the Foret de Haye, which a few days before had been heavily defended, and advanced over a mile without resistance. On the morning of the 15th, the Task Force advanced through the forest and by 1100 was in the city of Nancy. No resistance was encountered. Nancy was captured. The double envelopment had "paid off."

Conclusion

The battle of Nancy demonstrates the effectiveness of using the double envelopment as a means for destroying the enemy or forcing him to withdraw to avoid destruction. An attack through the Foret de Haye in the early stages of the operations would have been costly to XII Corps, for later information proved that this area had been strongly held and was indeed a formidable obstacle. The threat of envelopment from the north and south forced the defenders of this bastion to withdraw. The unopposed advance and occupation of Nancy by Task Force *Sebree* was undoubtedly made possible by the double envelopment.

The battle of Nancy further illustrates the soundness of the combat principles taught in our field manuals. A few of the principles applied in this operation are as follows:

Principle.—During the decisive phase of combat, the place of the commander is near the critical point of action.

Example.—The presence of the Corps Commander at the 80th Division bridge site enabled him to make an important and quick decision.

Principle.—The command seeking to attack by double envelopment must be deployed, or be capable of deploying, on a broad front against an enemy on a much narrower front or with little capacity for maneuver. The maneuver is executed by making a secondary effort in the center while striking with enveloping forces on both hostile flanks. When mobile reserves are available in reserve, they may complete the envelopment by an attack from the rear.

Example.—The principle is well illustrated by the battle of Nancy (see Map 4).

Principle.—The objective should have the following characteristics:

a. Its capture must be possible within the time and space limits imposed by the assigned mission.

b. The threat of its capture should compel the enemy to evacuate his position or risk destruction therein.

c. Its capture should facilitate contemplated future operations.

d. It should produce a convergence of effort.

e. It must be easily identified.

Example.—The operation plan of XII Corps applied this principle well (see Map 4).

Principle.—The armored division should be employed as a unit. The detachment of any element should be made with the knowledge that the ensuing effort of the division will be impaired.

Example.—The principle above is excellent. There are times, however, when the employment of armor will be dictated by the existing situation. XII Corps, operating on a wide front with a vulnerable flank and an obscure picture of the enemy, chose to employ the combat commands of the 4th Armored Division on separate missions.

Principle.—The infantry will normally provide a gap through fortified areas or bridge rivers for the passage of armored units.

Example.—Bridge constructed by 80th Division.

Principle.—Armored units are normally assigned deep objectives in order to exploit the gains of the infantry, to destroy enemy lines of communications, and to prevent withdrawal of the enemy.

Example.—The objectives assigned to elements of the 4th Armored Division were 20 miles behind the Moselle River line.

Continued study of the ground and practice in its adaptation to one's purpose is the key to tactical efficiency.

Major General C. H. Boucher, Great Britain

Success in almost every human endeavor depends upon the production of the preponderating force at the right place at the right time.

Rear Admiral T. H. Troubridge, Great Britain

North to Everywhere

Lieutenant Colonel William R. Prince, *Cavalry*
Instructor, Command and General Staff College

FORTY years have elapsed since the Wright brothers made their historic flight at Kittyhawk. In those days, distances were great and the world was 25,000 miles around. To a farmer in Kansas, China was on the other side of the world and therefore must be 12,000 miles away.

Since that historic moment when the simple flying machine of the Wright brothers barely lifted itself above the sand dunes of the North Carolina coastline, developments have been such as to necessitate a complete re-orientation in our concept of world geography. We have been thinking so long in terms of east and west crossings of oceans and continents by ships, road, and rail that it would take some time to accept what we have learned in the past few years—that the world is round in all directions.

Before long-range, pressurized, stratoliners made their appearance, our idea of travel was as though the world were flat. The distance from Washington, D. C., to Moscow was 6,000 miles, from New York City to Tokyo 7,500 miles. Roads, railroads, and sea routes encircling the globe followed generally along parallels of latitude, or around its fat girth. They could not penetrate and cross over the formidable, frozen, top and bottom sides of the world. The poles of the earth were the preserves of a handful of intrepid adventurers.

Mercator Projection

The world was treated as a cylinder, the ends of which represented the north and south poles. We split this cylinder up one side, opened it out, and laid it flat. For millions of persons, this type of projection onto a flat surface is probably the most common geographic representation of the world. It is the projection shown in Figure 1. A traditional Mercator projection, it has led to at least three widespread misconceptions.

One of these misconceptions pertains to distances. The distance between Washington and Tokyo laid off on a Mercator chart is about 7,500 miles, but if a string is stretched between these two points on a globe the distance is considerably reduced. A second misconception pertains to directions. On a Mercator projection, it would seem that one should travel almost due west to go from New York City to Tokyo, since both are at about the same north latitude, but the shortest route is in a northerly direction and cuts across the northern tip of Alaska. The third and probably greatest misconception pertains to distortion in size which occurs when we make a cylindrical projection of a sphere. On the Mercator projection, Greenland appears to be three times the size of Australia. Actually, it is but a third as large. A Mercator projection neglects the poles of the earth because the latitude of each pole, on such a projection, would equal

infinity. An example of the extent of distortion which occurs from this type of projection is shown in Figure 2.

Air Age Changes

With the advent of the Air Age, the already recognized principle that a great circle is the shortest path between two points on the globe came into the realm of wide practical application. Air routes between two such points in opposite hemispheres, while seldom passing over the North Pole, nevertheless cut great circles that fall well within the Arctic regions.

Why is the Antarctic excluded? Why should the same condition not hold for the south polar regions as well? An inspection of a world globe will help supply the answer.

Approximately 70 percent of all the land area of the world lies north of the equator. Of the 30 percent in the southern hemisphere, a third is the vast, isolated, largely unexplored and uninhabited Antarctic Continent, and therefore only 20 percent of the inhabited land area of the world is south of the equator. Those land masses within the northern hemisphere include all of North America, Europe, Asia, two-thirds of Africa, and one-sixth of South America. Sixty percent of all the water area of the world is south of the equator. Figuratively speaking, then, the north half of the world is land and the south half is water.

The population distribution is even more radical and further accentuates this half land, half water, concept. Ninety percent of the world's peoples are gathered within the northern hemisphere. Of the cities in which they live, 90 percent of all those having a population of 100,000 or over are north of the equator. By air, the capitals of all the great powers are closer to the Arctic Circle than they are to the equator. Mexico City and Chungking are both well within the northern hemisphere.

A climatological factor also favors the Arctic over the Antarctic. In general, the weather and climatic conditions over the Arctic are much less severe than those experienced on the Antarctic Continent.

These are reasons why the aerial highways between the new and the old world will cut across the Arctic. Greeley's famous advice may well be revised to a modern phrase: "Go north young man, go north!"

Polar Projection

Considering the world from an infinite distance directly above the geographic North Pole, we see that the pole is approximately at the center of the land masses of the world. A projection of the world, centered on the geographic North Pole, will supplant, in time, the more common Mercator chart as the familiar geographic face of the earth (see Figure 3). The full implication of a polar-centered world is not yet wholly appreciated. It will not be until commercial air transportation is fully developed.

The first thing that strikes one as he looks at a polar-centered map is that he is looking down into the center of an enlongated body of water almost completely surrounded by land. It has much the same general aspect as the Mediterranean Sea. Could this be the Arctic Ocean? It does look like an ocean on a Mercator map. Viewed in true proportion, as on a globe, it has more the appearance of a sea—the

Between the major land masses of the northern hemisphere, the shortest airline and water distances are across the Arctic regions, which are destined to grow in importance in world strategy, travel, and trade

Mediterranean of the north, in the middle of all the land masses of the world and separating Eurasia from North America.

Little known yesterday, this sea is becoming a most important body of water. It is the only natural body of water which physically separates the two great land masses, Eurasia-Africa, and North America-South America—this by only the 50-mile width of Bering Strait. How many people realize that one may travel from the southern tip of South America to the southern tip of Africa, pass through five continents, and hardly see water?

The Arctic Ocean

Since the Arctic Ocean is destined to grow in importance in world strategy, travel, and trade, it would be of interest to explore it briefly.

The surface covers an area of about 5,500,000 square miles. This is five times the area of the Mediterranean Sea and one-twelfth the area of the Pacific Ocean. Its expanse is entirely contained within the Arctic Circle and its perimeter is 80 percent bordered by land. If the Arctic Ocean is considered to include all of the waters within the Arctic Circle, its length is close to 3,000 miles and its narrowest width is 1,200 miles.

The Arctic Ocean is neither an area of extremely low temperatures (minimum of —55 F) nor of violent storms (55 miles an hour winds are rare). This degree of mildness, compared with the severity of the weather in the sub-Arctic, the Antarctic, and even in the North Temperate Zone, is due to the great body of water whose surface temperature is never lower than about 28 F, since salt water will freeze below that temperature. The pack ice on top of this great mass of heated liquid acts as a great stove lid through which the heat underneath must come through. As a consequence, the Polar Basin is much warmer than the surrounding sub-Arctic regions.

The main basin of the Arctic Ocean is quite deep. A sounding of 9,000 feet without bottom was taken by Robert E. Peary at the North Pole in 1909. The deepest soundings were recorded by George H. Wilkins in 1927, over 17,000 feet, 550 miles northwest of Point Barrow, Alaska.

Pack Ice

The principal characteristic of the Arctic Ocean is the pack ice which, even towards the end of summer, covers two-thirds of the surface. It has been variously described or imagined as a solid, homogeneous mass or cap, firmly and squarely implanted on the northern "top" of the earth. There is no vast expanse of solid ice or an ice cap as such, even at the North Pole. Admiral Richard E. Byrd gives the following description of the ice at the North Pole as he saw it during his historic flight on 9 May 1926.

"It did not look different from other miles of ice over which we had just passed. There was the same stretch of brilliant white marked by ridges, hummocks, and a few leads (open channels in the ice) recently frozen, showing green against white. From pressure ridges, I knew that the ice there was in constant motion. The ice was composed of large cakes, of fields whose edges, except at the leads, jammed up against each other and were pressed so tightly by wind and ocean currents that ice and snow was forced up to varying heights, depending upon the pressure exerted. Cakes were glistening white with hummocks. Here and there on most of them, and on some drifts caused by strong winds, I knew the surface was more uneven than it looked from the plane. Floes were of many shapes and sizes, and pressure ridges ran willy-nilly, apparently without rhyme or reason."

When the large floes break up during the summer, they remain separate until autumn. As winter approaches, low temperatures begin to cement the floes together. Then, under the stress of wind,

currents, collision with adjacent floes, and differential stress, leads form, exposing open water. In the winter, the open water in the leads freezes rapidly, cementing separate floes together and forming smooth, even surfaces. This process, together with the sluggish motion of the floes, makes it possible to travel over the ice with comparative safety during the winter, afoot or by sled. It was across such ice that Peary made his trip to the North Pole in 1909 from the north end of Ellesmere Island, a distance of 450 miles.

There has been much speculation as to the thickness of the pack ice, estimations anywhere from 20 to 200 feet may be gained from reading some literature. The 20-foot ice is an exception, and 200-foot ice is never there except where ice is piled up against beaches and is jumbled up in great masses. The latter, however, is not to be pictured as characteristic of the entire sea. There is more substantial evidence of the average thickness of the pack ice from two famous drifts by ships which have taken place in the Arctic Ocean: the Norwegian ship *Fram* (1893-1896), captained by Dr. Fridtjof Nansen; and a Soviet ice-breaker *Sedov* (1937-1940). Data compiled by the personnel of these two ships during the drifts indicates that in the 40-year period intervening between the two drifts the thickness of the pack ice had decreased by about 3 feet. The *Fram* recorded the normal ice depth as 10 feet, whereas the *Sedov* recorded a depth of 7 feet.

The ice of the Arctic Ocean is of two kinds: that type already described, which is constantly moving and has a natural drift in a clockwise direction toward an outflow between Greenland and Spitsbergen; and fast ice which is immobile and solidly anchored to the coasts. In the summer, the pack ice averages from 5 to 15 miles off shore and much of the fast ice disappears. Thus a relatively open water passage (shore lead) is provided for ships. However, due to the vagaries of the drifting ice floes, it is seldom that such passages can be navigated without the assistance of aerial ice reconnaissance and ice-breakers.

During the winter, the pack ice and the fast ice generally come together. Where the motion of the pack ice is rapid, as after a heavy gale when its speed may be 2 or more miles an hour, there is severe grinding of the pack along the edge of the land ice. The rending and crashing of the floes at such times is deafening.

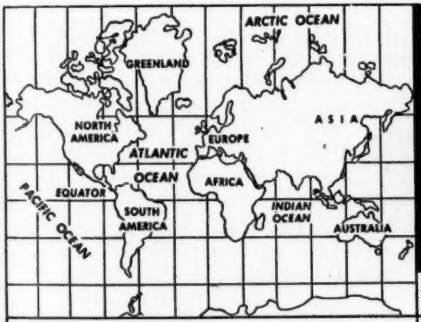


FIGURE 1. MERCATOR PROJECTION OF THE WORLD, CENTERED ON EUROPE.

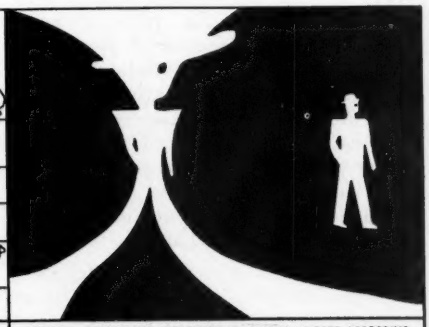


FIGURE 2. ON THE LEFT, THE FIGURE OF A MAN APPEARS ACCORDING TO THE MERCATOR PROJECTION. (FROM EVELYN STEFFANSSON'S "WITHIN THE CIRCLE," REPRODUCED BY PERMISSION OF CHARLES SCRIBNER'S SONS.)

Arctic History

Although man has probably lived in the Arctic for as long as 500,000 years, our recorded knowledge of life there dates from relatively recent times. Pytheas, a Greek astronomer and philosopher, made the initial contribution in the fourth century, B.C., when after sailing 6 days north from Scotland he found an island called Thule (Iceland). Proceeding north an additional day, he encountered much ice "through which the ship could not sail and which would not support man." Pytheas' brother philosophers gave him scant satisfaction in his contentions. They held to the then current belief that the frigid zone where Pytheas had claimed to have been would not support life. After Pytheas, there is little information on the Arctic until the colonization of Iceland by the Norsemen in the ninth century, A.D. In 983, using Iceland as a base, Eric the Red colonized Greenland, and 17 years later, during a voyage from Norway to Greenland, he apparently missed sighting the island and is presumed to have made a landing on the coast of Labrador.

Following this discovery of America, there is another gap of several hundred years in the history of further Arctic exploration. It was not until 1576, with the first of three expeditions conducted by Sir Martin Frobisher, that Europeans again took an interest in the Arctic. Gradually, the value of the fur trade in the north and the desire to navigate a northwest passage to the Orient increased the number of expeditions and added to the knowledge of the arctic. The great goal of being the first to reach the geographic North Pole resulted in a keen international competition and placed much emphasis on arctic travel and exploration. The whaling industry brought many people to the Arctic, where numbers of them settled permanently after the industry declined. With the advent of the airplane, exploration and colonization of the arctic lands received further impetus. A Russian, Lieutenant Nagurski, first successfully flew an airplane within the Arctic regions in 1916. Admiral Byrd made his famous flight over the North Pole 10 years later. Since that time, the USSR, Canada, and the United States have been in the forefront in carrying out many experimental and enterprising flights in, around, and across the Arctic. With the development of multi-engined, high-speed aircraft, Arctic flight is becoming commonplace.

Flying Conditions

It is a mistaken idea that flying conditions grow progressively worse the farther north one moves from the equator. Conditions do increase in severity from the equator until latitudes where annual mean temperatures around the freezing point are reached. In such localities are found dense fog, heavy, sticky snow, and freezing rain, all of which interfere with visibility and the aerodynamics of a plane. This area occurs within the North Temperate Zone and the conditions result from constant variations in temperature from warm to cold and reverse. North of this zone and within the Arctic, however, flying conditions through the whole year are less difficult.

The northern half of the bad weather zone in the United States is in Ohio; in Europe it begins south of Milan. Yet it cannot be denied that there has been a great deal of severe weather north of both these localities, particularly in the sub-Arctic. This brings us to the question of stratospheric flight.

The stratosphere is above all weather, and therefore stratospheric flight over the arctic will be similar to that over the equator, with one exception. The floor of the stratosphere decreases in altitude as one progresses north or south from the equator and continues to decrease until over the poles. Thus, while the strato-

sphere in northern North America may be entered at 20,000 feet, over the geographic North Pole it may be gained at 15,000 feet.

Besides our growing awareness of the short cuts offered by air travel across the Arctic, we are learning that the high-

bases, strings of radar and loran stations across the Arctic, and weather stations are needed for flight control and for safety.

The comparative safety of air travel over the Arctic Ocean, in contrast to other great bodies of water, is high-lighted by

FIGURE 3.—A POLAR CENTERED AZIMUTHAL EQUIDISTANT CHART.

altitude flying weather in this region is equal to or better than that at any other locality in the world. Before full use can be made of these dual advantages of distance and weather, advance operation

Vilhjalmur Stefansson in his discussion of the fate of an attempted transpolar flight by the Russian aviator Levanevsky in 1937. Stefansson wrote:

"Levanevsky was assumed to have made

a forced landing on the polar sea. Therefore, we consider the various oceans, how they compare for the safety of forced landings.

"Most flyers who have come down on liquid seas far from land and beyond sight of a vessel have been lost. All have been lost who made forced descents beyond the sight of rescuers in a gale.

"Before the Levanevsky flight, there had been perhaps a dozen forced landings on the frozen sea. Some were in good weather, some in falling snow, some in blizzards, and one in a combination of a gale and the darkness of night. All these had been safe descents—no lives had been lost and there had been only minor injuries to planes. The flyers were always saved in one of three ways; they made repairs and flew again; they were rescued, by plane or ship; or they abandoned their plane and walked ashore.

"Take specifically for the North Atlantic the entire period from its first crossing by the United States Navy airplanes in 1919 to the beginning of survey flights by Pan American Airways and Imperial Airways in 1937. During this period, at least 19 ocean descents were made in all weather from calm to gale. Nine planes were lost. The people saved were mostly those who had specially good luck, as coming down in fairly good weather either within sight of a ship or after being able to communicate to a nearby ship through radio an approximate position of their descent.

"During the same period, more than 90,000 miles were flown over the polar sea. There were at least 56 voluntary and forced descents in all weathers from calm to gale (not all Soviet figures are available). No lives were lost from any of these descents."

The importance of the Arctic to air travel is obvious. Less obvious is the importance of the Polar Sea as a navigable body of water.

Submarines

The problems involved in traversing the Arctic Ocean beneath the polar ice pack with a submarine are serious but not insurmountable. The first experiment of this type, made in 1931 by George H. (Sir Hubert) Wilkins in an attempt to reach the North Pole, ended in failure. The submarine *Nautilus*, formerly the USS *O-12*, was obsolete; despite extensive alterations and modifications designed to cope with expected conditions, she was no match for the ice. *Time*, 14 September 1931, describes the plight of the *Nautilus* at the conclusion of her venture in these words:

"They rammed their ice-borer, which was to give them escape if they were gripped under the ice, against an ice chunk and smashed it. Ice crushed the runners atop the *Nautilus*, which were to enable her to slide against the underside of ice fields. She sprang two leaks, became miserably dank within. The propeller edges became saw-toothed and bent, grinding against small ice."

The position of the *Nautilus* at the conclusion of this experiment was north of Spitsbergen and about 400 miles from the North Pole. Despite her severe mauling, she had submerged and navigated beneath the Arctic ice pack.

The modern submarine, with high submerged speed and capabilities of long submersion and great diving depth (nearly 1,000 feet in the experimental dive made by the French with one of the type XXI German submarines) could cross the Arctic Ocean at its narrowest width in less than 48 hours.

A new and more sensitive sonar gear would keep such a submarine constantly aware of its position in relation to the ice ceiling and ice tongues extending down into its path. Such gear would also locate areas of open water in the ice pack, into which a submarine could surface. Submarines in the Arctic in peace-

time would be useful as weather stations, radar picket vessels, and loran and aircraft beacon stations. Their strategic importance in war is obvious.

The fact that the shortest airline and water distances between the major land masses of the northern hemisphere are across the Arctic is alone sufficient to give strategic importance to the area in future global war. Strategically, Alaska, Greenland, and the islands of the Canadian Archipelago are the first line of North American continental defense. Development of these areas in peacetime will enhance their value in war.

Development

Great changes are taking place in the general methods of Arctic exploration and development. Side by side with private enterprise, governments have already begun to open up and exploit the northern lands which belong to them. The search for uranium, oil, and iron ore, as well as for natural waterways along the northern shores of North America and Asia, are speeding this work. These vast areas, woefully lacking in overland travel facilities, have been knitted more closely together by air services which connect their remote communities. The Arctic is destined to play a leading role in the coming age of long-range aviation. Most of the great commercial air routes of the world will have to cross the Arctic at one place or another. Air travel will lead to modern airports with all facilities for the comfort and convenience of the traveller. Eventually, the heretofore forbidding polar ice will serve the needs of civilization, by providing emergency landing fields and by supporting portable directional finding stations and light beacons which will chart unerring courses over the Arctic Ocean.

The ultimate passage to the Orient is aerial. The short cut from New York to Tokyo is via Hudson Bay, the Barren Lands of the Northwest Territories, and Alaska. The shortest distance from Chicago to Calcutta is straight north. In short, travel tomorrow will be North to Everywhere!

There are eight great industrial areas in the world today of sufficient productivity to be significant factors in a full-scale war. These eight areas center upon Japan, central Siberia, the Ural Mountains, Moscow, the Don Basin, western Europe, the British Isles, and northeastern United States. All of these key areas lie above 30° north latitude, and the two great land masses on which they are located—the Eurasian and North American continents—have one region of common tangency: the Arctic Ocean with its impassable ice cap. Although the polar ice cap is impassable to ships or surface forces, it offers no barrier to aircraft flying above it. The shortest air route between the central United States and the Urals, between Alaska and Germany, or between Greenland and Japan lies directly over the polar region. Clearly the whole cap of the world, from the thirtieth parallel to the North Pole, is the world of air power.

General Carl Spaatz

The Attack on Ploesti

Dr. Albert F. Simpson
Air Force Historian

This article is from Volume II of The Army Air Forces in World War II; Europe: Torch to Pointblank, August 1942 to December 1943, *edited by Frank Craven and James Lea Cate. Printed by permission of The University of Chicago Press, copyright owner, 1949.—The Editor.*

Ploesti

IN THE midst of the Sicilian campaign, on 1 August 1943, Mediterranean-based heavy bombers executed one of the outstanding air operations of World War II. This was the low-level B-24 attack on the Ploesti oil refineries in Rumania—the first large-scale, minimum-altitude attack by Army Air Forces (AAF) heavy bombers upon a strongly defended target and the longest major bombing mission, in terms of distance from base to target, undertaken up to that time.

The mission was not perfectly executed—but it heavily damaged the objective and as an example of brilliant conception, painstaking preparation, and heroism during execution, the operation had few if any equals.

Oil had been given a high priority in the planning of the Combined Bomber Offensive, but Ploesti, most inviting of all oil targets, lay beyond the reach of planes based in the United Kingdom. It was estimated that crude oil provided two-thirds of Germany's petroleum resources and that 60 percent of her crude oil came from the Ploesti fields—which was to say, approximately one-third of her total supply of liquid fuel. These fields, with an estimated annual capacity of 9 million tons, were considered to be of special advantage to the Germans in their operations on the Eastern Front, and thus an attack on Ploesti offered the means for rendering immediate assistance to the USSR.

The Russians themselves had bombed the fields several times in the summer of 1941 and again in September 1942, but with limited success. Within a month after Pearl Harbor, the Americans were studying the feasibility of bombing Ploesti, and AAF planes had struck at it from the Middle East in an ineffective attack as early as June 1942. Since then, the Ninth Air Force had been heavily committed to other operations in the attempt to drive Rommel out of Africa, and the heavies of the Twelfth Air Force, based between Algiers and Constantine, were too far from the target. Only with the impending defeat of the Axis forces in Tunisia had circumstances combined to suggest the

For brilliant conception, painstaking preparation, and heroism during execution, the bombing attack of 1 August 1943 on the oil refineries located at Ploesti in Rumania had few if any equals in World War II

possibility of a mass attack on Ploesti from North Africa bases.

Planning Phase

Principal contributors to the development of the plan included General H. H. Arnold, who, in April, had ordered the Plans Division of Headquarters, AAF, to revive the project; Lieutenant Colonel C. V. Whitney of the Ninth Air Force, who evolved a plan for a medium-sized, high-level attack to be mounted from Syrian bases; and Colonel Jacob E. Smart of General Arnold's advisory council, who originated the idea of a minimum-altitude, mass attack from the Bengasi area.

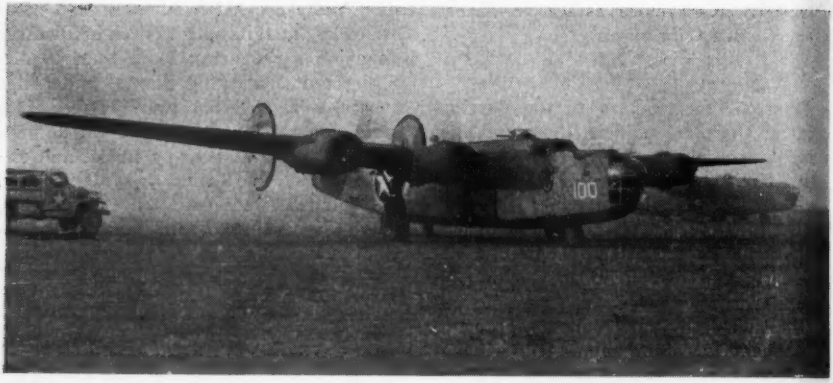
Colonel Smart's plan was approved by General Dwight D. Eisenhower and by the Combined Chiefs of Staff early in June. But because both Eisenhower and the CCS were unwilling for the operation to deprive *Husky* (the invasion of Sicily) of too many heavy bomber sorties, the planners agreed that Northwest African Air Forces would furnish only two groups of B-24s to Operation *Soapsuds* (the plan to bomb Ploesti—formerly *Statesman*, later, *Tidalwave*) and that the remainder of the striking force would be provided by transferring two groups of B-24s from the Eighth Air Force (93d and 44th) and diverting one group (the 389th) originally scheduled to move to the United Kingdom.

General L. H. Brereton, as commander of the Ninth Air Force, had charge of conducting the operation. His was the final responsibility for deciding to launch the raid from Libyan rather than Syrian bases and to attack at low instead of high altitude. Under his direction, the detailed plans for the operation were worked out and training conducted.

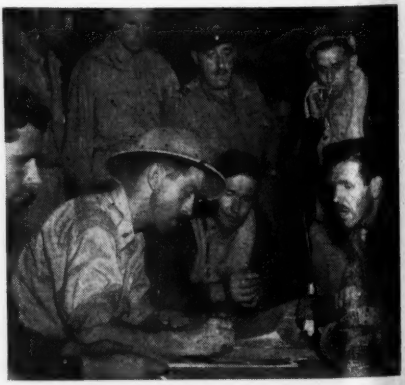
Final planning for the mission became the responsibility of a special staff at Brereton's advanced headquarters which included, in addition to Colonel Smart, specialists in such matters as low-altitude operations, intelligence, and weather. It was finally decided to hit a limited number of key installations in each of Ploesti's nine major refineries. More than 40 distilling units, cracking plants, and boiler houses were selected and grouped into seven general targets, five of which were at Ploesti, one at near-by Brazi, and one at Campina, some 8 miles away. Originally, 154 planes were allotted to targets, roughly according to importance and number of key installations; final allotments, however, totaled 177 planes.

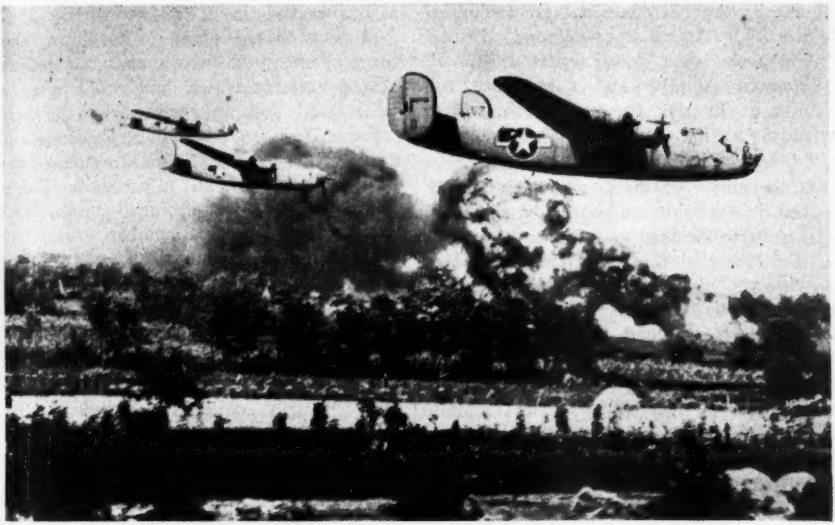
Assignment of Forces

Forces assigned to the seven general targets were as follows: the 376th Bombardment Group—the oldest group of heavies in the Mediterranean—was given Target *White I* (the Romana Americana refinery) and the honor of leading the flight; the 93d, which would fly directly behind the 376th, had Targets *White II* and *III* (the Concordia Vega, Standard Petrol Block, and Unirea Speranta re-

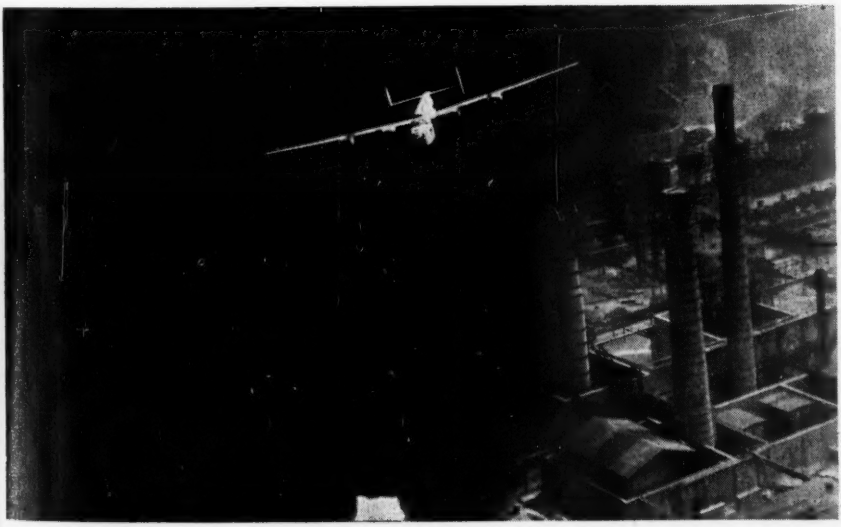


One of the outstanding air operations of World War II was the bombing attack by the Army Air Forces on the heavily defended oil refineries at Ploesti in Rumania, 1 August 1943. Above, one of the B-24 bombers returns to its African base after the bombing. Left, Major General Lewis H. Brereton briefs the men of the 376th Bomb Group at Bengasi, Libya, a short time before the attack. Lower left, one of the 1,000-pound bombs which were dropped on Ploesti with delayed action fuses. Lower right, flyers of the 376th Bomb Group are interrogated on their return to Bengasi after the attack.—US Air Force photos.





B-24 bombers (above) pass into the target area during the low-level attack at Ploesti, Rumania, 1 August 1943; fires have already been started by preceding planes. Below, a bomber looms up in sharp contrast to the heavy black smoke from fires as it passes at low-level over the Astra Romana refinery.—US Air Force photos.



fineries); the 98th was assigned Target *White IV* (Astra Romana and Unirea Orion); the 44th got Targets *White V* (Colombia Aquila) and *Blue* (Creditul Minier at Brazi); the new 389th, which would fly an individual effort, was responsible for Target *Red* (Campina).

Other major problems which had to be solved by the planners concerned the type of bombs to be used and the requirement of a different kind of bombsight from the one used in high-altitude bombing. Eventually, it was decided to arm the mission with 1,000-pound and 500-pound demolition bombs, totaling 311 tons, plus 290 boxes of British-type and 140 clusters of American-type incendiaries. The number of demolitions was 170 more than the number estimated as required to insure destruction of the targets; all had delay fuzes, those to be dropped by the first and second waves carrying delays of from one to six hours and those by the last wave of forty-five seconds. The planes were equipped with a new low-level bombsight and with two auxiliary bomb-bay tanks, which gave them a fuel capacity of 3,100 gallons.

The 93d, 44th, and 389th Groups arrived in the Mediterranean between 26 June and 3 July. There they joined the 376th and 98th in missions on behalf of *Husky*, partly for training purposes and partly to strengthen the air arm during the most vital part of the Sicilian campaign. Between 2 and 19 July, inclusive, the five groups flew 1,183 sorties—more than double the normal effort—against a total of 17 different targets. These operations reached their climax with the attack on Rome of 19 July.

Training

On the following day, the five groups were withdrawn from operations for intensive training near Bengasi. Between that date and 1 August, the crews practiced flying and bombing from minimum altitude and absorbed great quantities of data dealing with the route to be flown, the targets, enemy defenses, and the dozens of other items which had to be clearly understood and appreciated by the aircrews if *Tidalwave* was to be a success. A dummy target—a flat reproduction of the Ploesti targets laid out in a remote section of the desert—was bombed again and again until, as a crew member wrote, "we could bomb it in our sleep." Strenuous practice in flying virtually wing tip to wing tip and wave on wave was conducted. On 28 and 29 July, the entire task force participated in two coordinated and fully successful mock missions; on the second dry run, the bombers "completely destroyed" the targets in less than 2 minutes.

Soon after dawn on 1 August, the 177 planes, carrying 1,725 Americans and 1 Englishman, took off under the command of Brigadier General Uzal G. Ent. The 376th led the formation, followed (in order) by the 93d, 98th, 44th, and 389th. The route passed the island of Corfu, then swung northeastward across the mountains of Albania and Yugoslavia. Before the formation reached the Danube near Lom in Bulgaria, towering cumulus clouds destroyed its unity. Integrity might have been restored by the use of radio but this would have sacrificed the great advantage of surprise; consequently, the two lead groups reached the target somewhat earlier than the others, which cost the groups the advantage of delivering simultaneous blows and sent the following units over the target after the defenses had been alerted.

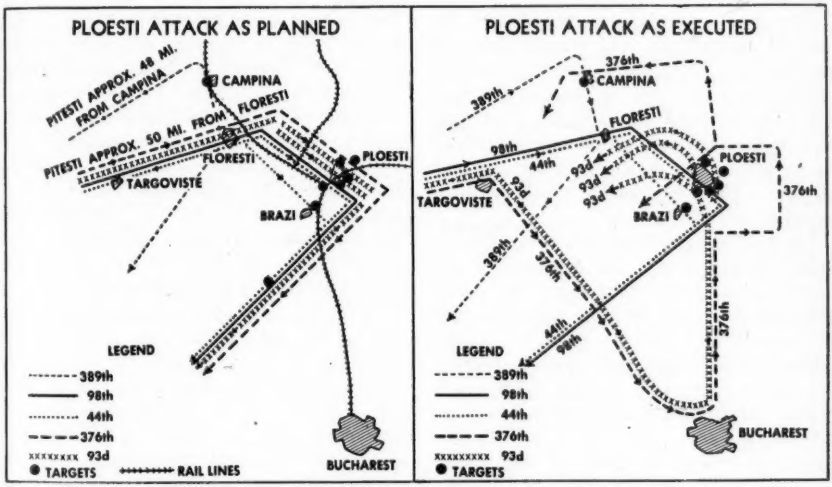
The first initial point (IP) was Pitesti, some 65 miles from Ploesti. There the 389th left the formation and proceeded to its target at Campina. There, too, all planes dropped to the minimum level of approximately 500 feet. Half-way between Pitesti and the final IP at Floresti, 13 miles northwest of Ploesti, the commander of the leading 376th mistook the town of

Targoviste for Floresti and turned southeast. Followed by the 93d, the 376th flew to the outskirts of Bucharest before realizing that a mistake had been made. Unfortunately, Bucharest was the headquarters of Rumanian defenses, which were promptly alerted.

The Attack

The 376th and 93d now turned northward toward Ploesti. Near the city they ran into such severe fire from ground defenses that the 376th turned east and then north in an attempt to reach its target from a less heavily defended direction. When the group reached a point northeast of Ploesti and in the vicinity of its target (Romana Americana), it met such intense AA fire that General Ent directed the planes to attack any target of opportunity which presented itself. Most of the Group's bombs fell in the general target area but only those from six planes led by Major Norman C. Appold, which flew directly into Ploesti and emerged covered with soot, were unloaded on an assigned target, the Concordia Vega.

When the 93d reached the outskirts of Ploesti, it did not turn east with the 376th but, instead, flew straight against the targets on the south side of the city. In spite of heavy flak and enemy fighters, the group, going in at altitudes of from 100 to 300 feet and losing 11 planes over the target, did a good job on the Astra Romana, Unirea Orion, and Colombia Aquila refineries. Unfortunately, these were targets assigned to the 98th and 44th Groups.



Meanwhile, the 98th and 44th, commanded by Colonels John R. Kane and Leon W. Johnson, arrived at the correct IP just after the 93d had finished its run. They found the defenses thoroughly alerted. Equally bad, they had to fly through fires and the explosions of delayed action bombs left by the 93d. The two groups would have been justified in turning back; instead, they drove straight against their targets through intense *flak*,

explosions, flames, and dense black smoke which concealed balloon cables and towering chimneys. B-24s went down like tenpins, but the targets were hit hard and accurately. As the two groups left Ploesti, they were jumped by enemy fighters, and on the way home were attacked by every kind of plane from *Me-109s* to unidentified biplanes, the last attacks coming after the Liberators were over the Adriatic. The 98th claimed 33 enemy planes destroyed, but it lost 21 over the target and on the return trip; the 44th claimed 13 victories but lost 11 planes.

The less experienced 389th, led by Colonel Jack Wood, had some trouble in getting into the right valley for its run against Campina, but it reached the target area with all the aircraft that had been dispatched and completely destroyed its objective. Its losses were the lightest of any of the four groups which actually attacked selected targets.

The bombers could not follow closely the flight plan for the return home from Ploesti because the groups had bombed at different times and in some instances had left the target accompanied by enemy fighters. No attempt was made to resume route formation as a unified force; each group, or part of a group, followed its own course, although the 98th and 44th remained together and most of the sound planes of all the groups followed the prescribed route to Berkovista, Corfu, Tocra, and Bengasi. Planes in distress generally made for Turkey or the nearest Allied fields on Malta, Sicily, or Cyprus. The final count showed that 92 planes reached Bengasi, 19 landed at other Allied fields, 7 landed in Turkey, and 3 crashed at sea.

Results

The Ploesti mission fell short of expectations and entailed heavy losses. Final reports showed that 54 planes had been lost, 41 of them in action. Lost, too—dead, prisoners, missing, or interned—were 532 airmen. On the credit side stood some very accurate bombing and a high degree of damage to the refineries—damage which might have been greater had not many bombs failed to explode. An estimated 42 percent of Ploesti's total refining capacity was destroyed. Possibly 40 percent of the cracking capacity was knocked out for a period of from 4 to 6 months, and the production of lubricating oils was considerably reduced. But though the over-all damage was heavy, it was not decisive. The Germans made up for lost refining capacity by activating idle units at Ploesti and by speedy repairs to damaged plants.

The hope for virtually complete destruction of the selected targets with results enduring for a long period of time had been defeated by errors of execution. No plan had been made for following through with other attacks. Until the late spring of 1944, Ploesti went untouched as tactical operations and strategic targets considered to be of greater priority than oil claimed the attention of the Mediterranean-based heavies.

Strategic air power is a powerful weapon. In the hands of the United States, strategic air power is primarily a deterrent to war. It is a means of quick retaliation against any aggressor.

General Hoyt S. Vandenberg

Economic Intelligence in a Theater of Operations

Lieutenant Colonel Carl T. Schmidt, *Infantry*
Former Instructor, Command and General Staff College

THE broad objectives of economic intelligence may be stated briefly as follows:

1. To indicate the enemy's (or potential enemy's) *industrial* capabilities of waging war;

2. To indicate the enemy's (or potential enemy's) warlike *intentions*, as reflected in economic measures and activities;

3. To provide knowledge essential to *economic warfare*—that is, to measures intended to restrict or weaken the enemy's industrial capabilities, both by denying him strategic materials from abroad and by destroying or capturing his economic resources and his war industries.

Within a Theater of Operations, economic intelligence will pursue all three objectives. It will lead to conclusions on the enemy's economic capabilities and intentions as they affect the theater commander's mission. Furthermore, it will provide the theater commander with intelligence that will assist him in conducting economic warfare with the means at his disposal. In this respect, a theater intelligence division will, of course, be assisted by intelligence agencies at higher levels. In turn, it will provide the higher-level agencies with economic information and intelligence of interest to them.

In practice, the major efforts of an economic intelligence section at the theater level will be directed toward the problems of *capturing*, *destroying*, or *weakening* the enemy's war industries. For this purpose, a knowledge of the enemy's economic strengths and weaknesses is necessary. Accurate intelligence must be developed on the economic-military character, location, and vulnerability of enemy industrial installations. This will lead to conclusions on (1) the degree to which the enemy's military effort would be hampered by loss of specific materials and facilities, and (2) the extent to which we can, with the means available to us, capture or attack such materials and facilities. Furthermore, the *effects* of attacks upon the enemy's economy must be studied.

Thus, economic intelligence will assist in answering such questions as the following: Where, in terms of our current strategy, shall we apply pressure against the enemy's industrial support of his armed forces? What specific industrial targets shall we attack or seek to capture?

The major efforts of an economic intelligence section in a theater of operations will be directed toward the problems of capturing, destroying, or weakening the war production industries of the enemy

Where are such targets? In what priority and with what means shall we attack them? What are the results of attacks upon specific industrial targets? Shall attacks be continued against these targets? If so, with what means? How often shall such attacks be repeated?

Scope

Aspects of the enemy's war economy (as well as of the economies of areas overrun by the enemy) of interest to a theater intelligence division include:

1. General economic organization of the enemy-held areas—that is, the enemy's military-economic system;
2. Industrial raw materials;
3. Processing and manufacturing industries—basic processing (e.g., oil refining), basic equipment manufacture (e.g., machine-tool production), end-products manufacture (e.g., munitions production);
4. Transportation (land, sea, and air) and storage facilities;
5. Communications;
6. Public utilities (e.g., electric power industry);
7. Food resources;
8. Foreign economic relations.

Problems of enemy *manpower* will also be of interest at the theater levels. Provision should be made within the theater intelligence division for study of this subject (as for example, the enemy's resources of industrial and military manpower, the enemy's use of the manpower of areas overrun by him). Furthermore, enemy *urban areas* will be of concern at the theater level, as, for instance, in connection with air attacks on enemy cities. The staff section responsible for economic intelligence may logically be charged with the development of intelligence on manpower and urban areas. Such a section might be variously designated. For purposes of this discussion, it is referred to as the economic intelligence section.

Planning

The staff officer in charge of an economic intelligence section will make plans for the collection of economic, manpower, and urban information, and for its control and processing, evaluation, interpretation, and dissemination. Careful planning is necessary to ensure proper application and coordination of effort and to prevent needless duplication. Plans must bear on the specific items of information needed, the availability of agencies to obtain such information, and on requests for information to be collected by theater and other agencies. As the situation develops, plans must be modified to meet new requirements.

Collection of Information

The economic intelligence section must collect information that, as we have seen, will:

1. Throw light on the economic capabilities and intentions of the enemy;
2. Indicate economic targets suitable for capture or attack.

To this end, the section will collect information through theater agencies and will request non-theater agencies to obtain information beyond the scope or resources of theater agencies. In turn, non-theater agencies will request information from the economic intelligence section (through the theater commander). The chief, economic intelligence section, recommends essential elements of information on economic, manpower, and urban matters, and, as necessary, recommends the agencies suitable for collection of the desired information.

Much of the basic data necessary to the theater will already have been collected and prepared in the form of studies and reports by higher intelligence agencies. In addition, a variety of general and special studies on the enemy economy, manpower, and urban areas should be available in the

zone of the interior and in the theater.

The field sources will include materials available from libraries, educational and research institutions, and commercial, shipping, and engineering firms. Also, it will probably be necessary from time to time to request higher intelligence agencies to undertake new studies.

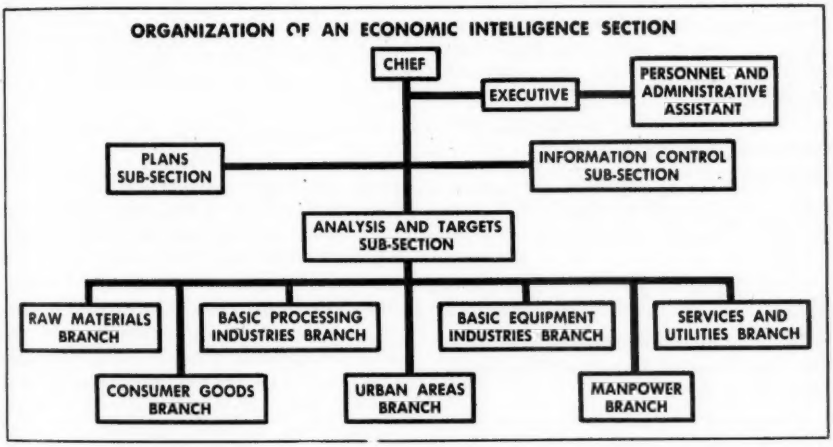
The major source of current economic information will doubtless be air photographs. Air photos are essential for the location and identification of industrial and transportation targets. They are necessary to the detailed analysis of targets, before and after attack. Even if information from other sources is extremely limited, air-photo interpreters are able to provide a great deal of accurate and valuable information on the enemy's industries.

Other sources may also yield economic information of great value. Certain refugees and prisoners of war, for example, may have information of significance from an economic standpoint. Prisoners will also be a source of manpower and urban information. Captured matériel and documents may have importance. For example, analysis of enemy matériel may yield information on the enemy's raw material situation, his output of specific munitions, and the effects of our economic warfare. The hostile and neutral press and radio broadcasts will be studied for various intelligence purposes. Such study may provide information useful to analysis of the enemy's economic and manpower situation.

Target Analysis

A major function of the economic intelligence section will be the analysis of potential and actual targets—industrial, manpower, and urban. Included in this function are the determination of appropriate targets, recommendations as to priorities, and damage assessments.

In its broader sense, target analysis involves a study of the enemy's economy, his lines of communication, and the relationship between his industrial activities and his military operations and strategy. Such broad study is directed toward determining the critical factors in his war industry and their vulnerability to attack. Conclusions are drawn as to vital objectives, which, if destroyed or neutralized, will



contribute most directly to the accomplishment of the theater mission. These objectives having been determined, a detailed examination is made of specific targets within the objectives to ascertain their functions and relative importance (functional analysis) and vulnerability to attack with available weapons (structural analysis).

In recommending priorities for strategic targets, consideration should be given by the economic intelligence section to:

1. Indispensability of target to the enemy war economy;

2. Enemy situation relative to current production, capacity for production, possible substitutes, stockpiles, import possibilities, and capability of reconversion and disposal;

3. Time lag between destruction of installations and desired effect upon the enemy war effort ("depth");

4. Number, location, distribution, accessibility, and vulnerability of vital installations;

5. Recuperative possibilities of the industry.

Target studies and recommended priorities are submitted to appropriate theater staff agencies.

Assessment of damage inflicted upon a target is also essential. This is accomplished by visual observation and study of photographs. Conclusions drawn from such appraisals, together with information on the effectiveness of the means employed, are submitted to appropriate agencies. Target lists are continuously studied and, if necessary, revised on the basis of damage assessments and newly developed intelligence.

Dissemination

Economic intelligence must be disseminated in accordance with its urgency. It must be concise, free from irrelevant matter, and in readily available form. The theater intelligence officer will prescribe the scope of dissemination, priorities, standards of form, and security precautions. Material prepared for dissemination by the economic intelligence section will include periodic reports, estimates, special studies and summaries, overprinted maps, and annotated photographs and mosaics.

Relations with Other Headquarters and Agencies

Much of the broad, fundamental information required by the economic intelligence section will be obtained from higher intelligence agencies. Also, there will frequently be need for further study at higher levels of information collected within the theater.

For example, the economic intelligence section will need a number of basic handbooks providing background material on important aspects of the enemy's economy, such as his railway and highway system, his petroleum, electric power, iron and steel, and aircraft industries. Ideally, these studies will be available on the outbreak of hostilities. But they may not be. Theater agencies will not have the time and personnel needed to prepare such studies, nor will they have access to all the pertinent sources. However, the economic intelligence section cannot passively wait for required studies to be produced elsewhere; it must initiate requests for them.

The point is that economic intelligence will be pursued concurrently at national and theater intelligence levels. The flow of materials will run in both directions. In order to expedite that flow and to efficiently control its quality, close working relationships among several agencies are necessary. Therefore, provision must be made for suitable liaison. For some purposes, interchange of staff personnel for limited periods may be desirable.

Organization

The specific organization of a theater intelligence division—including a subordinate economic intelligence section—obviously must depend upon directives from higher authority, upon the mission and means available, and upon the points of view of the theater commander and his principal assistants. Theoretically, a suitable organization for an economic intelligence section would be as outlined in the accompanying chart.

Functions of the several sub-sections shown on the chart would broadly be as follows:

Plans sub-section: Assists in the planning and exploitation of economic intelligence activities.

Information control sub-section: Assists in controlling the research activities of the section and in disseminating economic intelligence.

Analysis and targets sub-section: Analyzes pertinent information and produces intelligence on economic, manpower, and urban subjects.

A difficult problem will be the procurement and retention of qualified personnel. Liaison with higher authority should be established early for this purpose. Requisite personnel may be obtained directly from comparable sections of higher-level intelligence agencies and from other governmental organizations. Also, liaison for the same purpose should be maintained with the replacement systems of the various forces. In practice, there probably will never be enough experienced personnel available to meet ideal standards.

Much of the personnel required by an economic intelligence section must be highly specialized—in industrial economics and engineering, industrial architecture, transportation and communications, economic and urban geography, population, city planning, fire engineering, photographic, and language interpretation. These specialists must come largely from the civilian professions, especially from engineering, research, and educational institutions.

Conclusion

Action against the enemy's war industries will be an important element of a theater commander's mission. Economic intelligence will be essential to him for this purpose; in addition, it is pertinent to estimates of the enemy's situation and capabilities. Timely provision must therefore be made for the production of economic intelligence at the theater level.

Accurate, coordinated intelligence is essential to the future freedom of the United States.

Armed Forces Talk

Logistics and Mobilization

Lieutenant Colonel J. H. Weber, *Ordnance Department*
Instructor, Command and General Staff College

MODERN global warfare is fundamentally a contest of logisticians. The pace of mobilization, the strategic application of armed force, and the winning of a peace are directly dependent on the skill of logisticians. The military strategist, whether he is concerned with the formulation or execution of worldwide or theater plans, must be completely versed in all aspects of the science of logistics. He should be familiar also with the effects of military operations on the national and international economy. On the other hand, the political and economic strategists in government and industry must have an insight into the realities of modern war. They must work both to support the military effort and to preserve the foundations of the nation.

Economic Mobilization

The all-pervading influence of modern war on the nation is indicated by the changing terms which have been applied to mobilization for war. First—military, next—industrial, and finally—economic. Economic mobilization for war is an all-inclusive concept. It denotes the participation of all citizens and the utilization of all national resources in the event of war.

The importance of economic mobilization planning and operations was first appreciated fully by Bernard Baruch. In November 1918, he and his associates in the War Industries Board of World War I drew up a mandate for existence to be used by the nation in the event of a future war. This mandate was a blueprint for total national mobilization.

In the fall of 1947, while testifying before a Senate Committee investigating the status of the National Security program, Mr. Baruch stated of this mandate: "It is as true today as it was on 10 November 1918. It will be equally true of the next war, which the fates forbid. If I am to be pinned down as to its economic and industrial aspects, then I say to you that because of our inability to apply corrective methods when they were clearly indicated, the War (World War II) cost us, unnecessarily, thousands of lives, extra billions of dollars, and months of time."

At the beginning of World War II, this country started mobilizing from scratch. Not until fairly late in the War—after a long succession of boards and offices had been created, merged, and abolished—did we catch up with the plan outlined by Mr. Baruch in 1918. An industrial mobilization plan published by the War Department in 1931 and revised as late as 1939 was never used. Although this War Department plan had a number of weaknesses, it approximated very closely the organization and procedures which finally were evolved. One of the major faults of the plan was the assumption that it would be-

come effective on M-day, or the day war was declared. This inflexibility obviously was not geared to reality. The nation was mobilizing on an increasing scale during the 18 months preceding Pearl Harbor. Other faults in the plan were related basically with the public repugnance of war. The 1939 plan was written against a background of antimilitary feeling. The planners were forced to work behind closed doors. They were classed as war mongers. There was no effective collaboration with other federal agencies.

What are the problems of mobilization for war? Other than training and field operations of combat forces, they are logistical problems. For the military, they include the provision, distribution, and maintenance of equipment and supplies; the transport of troops and cargo; the construction and maintenance of facilities and communications; the care of the sick and wounded; and the induction, classification, assignment, welfare, and separation of personnel. For the nation as a whole, they include the conversion of industry for munitions production, the imposition of economic controls, and the adjustment of the civilian community to wartime demands.

An appraisal of some of the more important logistical aspects of mobilization can be made by examining the experiences of World War II. Compared with previous wars, World War II was, indeed, a logistician's war. Its outstanding characteristics were the totality with which manpower and resources were mobilized and the vigor with which belligerents attempted to destroy each other's resources for waging war. Logistic limitations dictated our strategy. They controlled the type and timing of campaigns to be fought. Ultimate victory in each theater was assured only when the quantity and quality of our weapons and equipment surpassed those of the enemy.

If any indisputable lesson can be drawn from World War II, it is that in any major war of the future no nation can emerge victorious without substantial superiority over its enemy in the quality and quantity of its weapons and supporting equipment and supplies.

Limited Resources

Before World War II, it was customary to consider the potential resources of the United States as practically unlimited and sufficient for any war in which the nation might become involved. The demands of World War II, however, in some respects reached and exceeded the limits of our resources. There were at all times limitations of one kind or another upon the production of essential items of munitions. Substitute materials, both natural and synthetic, were used whenever possible. In some cases, even these were unsuitable or inadequate. Coupled with shortages of materials, there were shifting requirements, shortages of production facilities, and other factors which at one time or another caused critical shortages of important items such as bombs, heavy artillery ammunition, heavy trucks, tires, radio tubes, and cotton duck.

"In any major war of the future, no nation can emerge victorious without substantial superiority over its enemy in the quality and quantity of its weapons and supporting equipment and supplies."

The armed services themselves contributed, in part, to the shortages and confusion. The logistical organizations and procedures within and between the armed services were far from perfect. Too much of our success was accomplished by inefficient practices. Duplicating supply lines

and different standards of services among the armed services complicated and retarded logistical operations. Experience demonstrated the necessity for an integrated logistical organization with simplified and uniform procedures and with a greatly simplified list of items of supply and equipment.

Controls

Partially as the result of shortages of resources, various types of controls were instituted on a progressive basis during the War. Unfortunately, many of the control actions were taken after, instead of before, the fact. Furthermore, they frequently were improvisations which were unnecessarily complicated and not properly related to each other. The controls imposed for the purpose of directing the resources of the nation into the most important channels were neither as complete nor as severe as those of our allies or our enemies. Conservation measures and many restrictions on materials and facilities for nonessential production were voluntary and only partially effective. Production for civilian use continued at a considerably higher level than that of either our allies or our enemies. Controls are distasteful to the people of a democracy, and their use can be justified only in time of emergency. The lesson to be learned, however, is that we could have maintained a better balance of productive effort and increased the production of munitions by the earlier use of better integrated controls.

Requirements

Closely allied to the use and control of resources is the matter of requirements. Requirements fall in two general categories: civilian and military. Another lesson we learned the hard way from World War II was that requirements for military operations as well as those for the civilian economy cannot be solved today for tomorrow, and cannot be solved by the use of simple mathematical calculations.

In a total war, requirements must be scheduled over months and years and they must be completely interrelated and balanced. A combat commander in the field cannot decide today that he needs 500 additional tanks next week or next month. He will be lucky to get them 6 months or a year later. Their production requires a reallocation of materials and a readjustment of production schedules. A shifting of labor forces may be involved. Transportation allotments and schedules may have to be revised. Finally, other items may have overriding priority of such urgency that tank production may be decreased rather than increased.

Generally speaking, military requirements were handled satisfactorily. The record on civilian requirements is not so bright. The latter received both belated and incomplete consideration. Fortunately, all elements of the nation had acquired a considerable layer of economic fat prior to the War. They were fairly well supplied with consumers goods and commercial equipment, generally in a good state of repair. The economic boom of 1939 through 1941 contributed to this happy situation. Little provision was made after we entered the War, however, for reasonable maintenance or replacement of such supplies and equipment, much of which was essential to the continued economic and social vigor of the nation. Had the War lasted much longer, the effects of wear and tear would have been felt seriously in such activities as transportation. Actually, emergency production orders had to be resorted to for such taken-for-granted items as commercial dishwashing and laundry machines.

Scientific Research

Another integral part of the mobilization picture which was high-lighted during World War II is scientific research.

Never in the history of warfare were there more rapid and far reaching developments in weapons and equipment. This was achieved by the unprecedented teamwork of science, industry, and the military. Our continued security depends upon the maintenance of this close collaboration. Scientific research is never static, nor is the secrecy surrounding weapons and production processes permanent. Our present superiority cannot be retained without a comprehensive long-range research and development program.

Still another aspect of mobilization is that of dispersion and economic flexibility. We alone of the major participants in World War II did not suffer war damages on the production front. But it can happen here. Therefore, we must avoid the possibility of a continental Pearl Harbor which would seriously paralyze our logistic capabilities. We must duplicate our present sole supply sources of critical materials and products. We must duplicate installations to eliminate bottlenecks in production facilities and transportation systems.

The Time Factor

The most important factor of mobilization is time. In both World Wars, circumstances provided us with ample warning. We had a period of protection by our allies in which to mobilize. No aggressor will make this same mistake a third time. Our nation must be carefully and skillfully prepared for instant and complete mobilization. Such mobilization may commence when an attack appears imminent or immediately following an attack. It is vital that intelligence should give us adequate forewarning of such attack. Above and beyond such warning, however, we must have reserves of materials and supplies, of facilities and tools, and of trained retaliatory forces to bridge the gap between the operations of the peacetime and the wartime economies. It is, therefore, imperative that we plan carefully and execute beforehand all preparatory measures which will save the time we will most certainly need.

The principal logistical aspects of mobilization mentioned above are: organization, procedures, controls, requirements, materials, facilities, research, dispersion, and time. Each aspect has its attendant problems which are all inextricably interrelated. A fair question to ask at this point is: What is being done to solve these problems? Happily, definite progress is being made.

What is Being Done?

The National Security Act of 1947 created a national security organization for the first time in our history. The act recognizes the importance of, and provides for, integrated action by all elements of the nation. Further, it established a basic organization which can be swiftly expanded without major change to cope with emergencies. A discussion of the new logistics organization for national security recently appeared in the MILITARY REVIEW. ("The Organization of Logistics under the National Security Act of 1947," by Colonel I. K. Evans, September, 1949.)

All elements of the security organization are codifying existing and proposed emergency documents related to procedures and controls. The objectives in this work are simplicity and uniformity. Industry and all federal agencies are actively participating in this project.

The determination of military requirements is being accomplished in a more realistic and balanced manner by the actions of the Joint Staff and the Munitions Board. These agencies work in close collaboration. They insure that the requirements necessary to support strategic plans are capable of being furnished from that portion of the national productive resources which can be allocated for military purposes.

The operation of this procedure has already been put to test on several occasions. An actual case will serve as an example. The Joint Chiefs of Staff formulated a proposed strategic plan of an all-out magnitude. The Joint Staff determined the broad logistical requirements in terms of equipment and supplies. The three armed services reduced those figures to specific quantities of items on production schedule bases and to materials and facilities necessary to meet the production schedules. Finally, the Munitions Board, having been informed by the National Security Resources Board of the allocations of materials and facilities available for military requirements, determined whether availability was sufficient to meet demand. In this instance, military demands were too high and could not be met. The Munitions Board, accordingly, advised the Joint Staff that the strategic concept would have to be revised on a less ambitious scale.

In the supply field, both the National Security Resources Board and the Munitions Board are actively and continuously collecting and analyzing data with respect to raw materials, production facilities, and services such as transportation and communications. This information obviously is essential before reliable allocations of materials and facilities can be made. Furthermore, it serves as a basis for determining and taking steps to alleviate potential shortages.

Stockpiling

The stockpiling program administered by the Munitions Board is an example of this type of activity. In its last report to the Congress on this program, the Munitions Board cited the following facts:

The program is coordinated with industry and all agencies of the federal government, including the Economic Cooperation Administration. Contracts are being made for deliveries over 5-year periods. The average value of contracts made during the latter half of 1948 was 67 million dollars per month. Virtually the entire 800 million dollars authorized by Congress had been spent, committed, or earmarked for pending contracts as of 31 December 1948. The total cost of the program as now established is roughly 4 billion dollars. Another active preparatory measure is the retention and preservation of machine tools. Lack of machine tools was one of the first bottlenecks and lost-time causes experienced in converting industry for World War II munitions production. We now have a stockpile of about 60,000 general purpose machine tools with a target of 90,000. Another program deals with war plants. The government has retained on a standby or leased basis, or has sold under a National Security clause, about 300 industrial plants whose wartime cost was in excess of 5 billion dollars. Further, the Munitions Board is supervising a survey of 80,000 industrial plants to determine their adaptability to war production. Varying amounts of productive capacity in 20,000 of these plants are being allocated to the various armed services procurement agencies with the approval of the National Security Resources Board. A selected number of these latter plants is being given contracts for engineering and production studies for new and complicated military items.

Research and Development

The activities of the Research and Development Board are directed toward three main objectives. First, it coordinates all military activities in the scientific and technological fields to insure that the best use is made of the best talent available. Second, it directs the attention and work of available talent to the most important fields and items. Third, is serves to insure that end products and processes are practical from both materials and facilities standpoints. In the event a National

Science Foundation or similar organization is established, the relationship between it and the Research and Development Board will be similar to that now existing between the National Security Resources Board and the Munitions Board.

The planning and preparatory measures mentioned above are illustrative but not inclusive. They indicate the wide range of activities being pursued by elements of the organization for national security. This organization consists of federal agencies, private industry, educational institutions, and unattached individuals. The ultimate purpose of this planning and preparatory work is to save time. In the event of another war, our most valuable resource will be time. Its conservation should be our most important concern. We must assume that if future aggressor nations have learned anything from World Wars I and II, it will be that they must never let this nation's industrial power get under way. They must cripple or destroy it at the outset if they are to win. In World War II, without the use of plans or preparatory measures, it required us 4 years to mobilize sufficiently to mount and support the Normandy invasion. Furthermore, this tremendous logistic effort was relatively free of enemy interference. If we are, in the future, to avoid this unnecessary and, perhaps, fatal expenditure of time with its concurrent toll of lives and resources, we must plan and prepare now against possible future emergencies.

A statement made in 1934 by General Wladyslow Sikorski, former commander in chief of Poland's armed forces, could well serve as the text for our mobilization efforts. In anticipation of coming events, he said: "We have to be prepared for a trial of strength which would engage in the struggle, from the very first days of mobilization, well-organized and formidable forces. But the whole of the organization for defense should go further and be ready for a total war that is a mobilization of all the vital forces of the nation. The Army alone is not enough. A preparation of this kind must be the work of a whole nation and the outcome of an active collaboration of the political, economic, and military authorities. It makes an appeal to the moral as well as the material forces of the nation."

There is no denying that a totalitarian government, exercising dictatorial powers over a completely regimented population, can attain more flexibility in the use of manpower and other resources for military purposes than can a Democracy. Consequently, a totalitarian government can place itself in a high degree of military readiness at relatively low cost. But should we resort to such methods and regimentation in a Democracy, we would lose the very thing we would be preparing to fight for—our freedom as individuals. By regimenting ourselves in order to put ourselves on an equal footing with the totalitarian nation we would, in effect, be surrendering to totalitarianism.

Secretary of the Air Force W. Stuart Symington

The Logistical Planning of Operation Overlord

Lieutenant Colonel Frank A. Osmanski, *General Staff Corps*

This is the last of three articles by Lieutenant Colonel Osmanski on the logistical planning of Operation Overlord.—*The Editor.*

PART III

Strategic Guidance

THE COSSAC and SHAEF strategic logistical planners imparted strategic guidance in logistics matters to, among others, the major commands of ETOUSA by employing, or being prepared to employ, the following means:

Standardized outline logistical planning factors.

Strategic logistical studies.

Logistical planning directives.

Administrative instructions.

Allocations of logistical resources.

Staff visits.

Review of logistical plans and policies of lower headquarters.

Early in its existence, COSSAC developed outline logistical planning factors based originally on *Roundup* findings and on experience reported from operations in the Mediterranean, which were successfully revised and improved on the basis of statistical data emerging from actual operations in Europe. It is considered that it would have been ideal had these factors, or improvements on them as recommended by other logistical planning staffs and approved by SHAEF, been made available for universal use throughout the theater. As it was, however, these factors were used exclusively in SHAEF while other logistical planning staffs used various other factors, which usually differed in their derivation or need for interpretation before use.

The usual medium employed by COSSAC and SHAEF to impart strategic guidance in logistics matters to subordinate headquarters and to the theater services was studies of the form which are known at the Command and General Staff College as the Strategic Logistical Study. For lack of a better name, they were then called an Administrative Appreciation, a term borrowed from the British to replace the awkward contemporary American equivalent of the Estimate of the Supply and Evacuation Situation, since renamed Administrative Estimate.

These COSSAC and SHAEF documents differed from the strategic logistical studies taught at the Command and General Staff College only in that they were almost entirely an estimate of the situation, and their directive feature was only implied or even omitted. COSSAC produced an early administrative appreciation in three parts, the first part dealing with the development of lines of communication inland from the assault beaches separately for the US and British and with the inter-allied administrative boundary to D+90. The second part dealt with a proposed system of logistical liaison and control by which each succeeding higher headquarters in turn insured that its more compre-

hensive plan for the development of the lines of communication was not prejudiced by earlier work performed on the ground by subordinate headquarters which had entered first. The third part discussed and decided basic logistical policies such as levels of reserve, provision and use of defensive and offensive chemical equipment, means of medical evacuation during the successive stages, scales of water consumption to be used for planning, and disposal of salvage and scrap.

SHAEF produced two administrative appreciations, one in June 1944 and the other in November 1944, the outline form of which closely parallels that for the Logistical Estimate taught at the Command and General Staff College (see Chart 13).

COSSAC and SHAEF rarely issued formal logistical planning directives. The Administrative Appreciations were distributed widely to all strategic planners, both operational and logistical, for information and guidance. No directive was expressed. However, because of the close contact with other US and British logistical planners which was maintained by the Chief and the Deputy Chief (the former being American and the latter British) of SHAEF G-4 (Log Plans Branch), there was normally the understanding among all concerned that a directive was implied and intended in the appreciation.

On one occasion, however, SHAEF did issue a full-fledged formal logistical planning directive. That was on 5 February 1945, under the subject: Administrative Preparations for Spring Offensive. It directed that Com Z prepare for the logistical support of 15 to 18 US divisions (including 2 airborne) north of the Ruhr as well as of 8 static divisions in the area west of the Ruhr and on the near bank of the Rhine; and for 24 US divisions, expanding finally to 35 to 40 US divisions, south of the Ruhr. Ostensibly, therefore, G-4 (Log Plans Branch) SHAEF had not overlooked the contingency realized in the Remagen bridgehead. Indeed, Com Z even anticipated the support of such contingency by the timely preparation of its emergency (XYZ) truck transportation plan.

COSSAC and SHAEF also issued Administrative Instructions (SHAEF called them Administrative Memorandums). COSSAC covered the policies developed in Part III of its Administrative Appreciation (see Chart 14), whereas SHAEF dealt with such matters as local procurement, use of civilian labor, and ration scales for prisoners of war and displaced persons.

At critical times, notably in the fall of 1944 when transportation bottlenecks were limiting tactical operations, SHAEF imparted strategic guidance by the allocation of tonnages to the Army Groups, Air Forces, and Communications Zone. On the basis of this allocation, train paths, rolling stock, truck companies, pipehead capacities, and air supply could be allotted. The method used was, in coordination with G-3 who indicated the relative priorities of support to be accorded the several armies in the field, to apportion the available forward movement capacities equitably to the consuming commands (see outline in Chart 15).

Representatives of the G-4 (Log Plans Branch) SHAEF made regular staff visits to the Army Groups, Com Z, and the Armies to assure themselves that logistical planning was progressing favorably and to collect from current operations those logistical data that might be useful in

On the basis of Operation Overlord experience, the author believes, G-4 Plans Branch at theater or combined headquarters level should have sections for long-range planning, short-range planning, and statistics

Outline of
SHAEF ADMINISTRATIVE APPRECIATION
POST-OVERLORD OPERATIONS

INTRODUCTION
(summary of recent events or revised strategic concept which requires a new logistical estimate and plan)

OBJECT
(purpose, usually "To formulate plans and policies for the logistical support of operations during the period ----------")

STRATEGY
(brief of planning forecast, illustrated on map showing phaselines and anticipated dates of capture of major ports)

INTELLIGENCE
(enemy capabilities to react which will affect such logistical factors as rate of advance, degree of "scorched earth," interference with our lines of communication, etc)
(topography and communications)
(climate and weather)

LOGISTICAL FACTORS
Ports and port capacities
Shipping
Build-up of troops
Estimated requirements
Ground forces
Air forces
Transportation equipment and supplies
Engineer equipment and supplies
Coal
Organizational equipment (incl boxed vehicles)
Civil relief
Miscellaneous (incl Navy, Red Cross, RAMP, PW, DP, USO, Press, etc)
Total gross requirements
Bulk POL
Local resources (Construction materials, coal, foodstuffs, etc)
Total net requirements for import
(Total gross requirements *less* local resources, with bulk POL shown separately)
Estimated forward movement
Maintenance of combat zone
Reserves to be built in forward areas
Miscellaneous traffic (incl tactical moves, replacements, administrative vehicles, ambulances, etc)
Estimated rearward movement
Salvage
Assemblies for repair
RAMP, PW, and DP
Casualties
Captured war matériel
Coal (from mines in forward areas)
Redeployment
Leave parties
Inland transportation capacities
Road
Rail
Inland waterways
Pipeline
Air

COMPARISON OF REQUIREMENTS AND CAPACITIES
Net import requirements and import capacities
Ports — MULBERRY
Bulk POL — Beaches
Air
Forward movements with inland transportation
Rail)
Pipeline) primary
Road)
Inland waterways—secondary
Air—emergency
Rearward movement
Effects on inland transportation
Effects on import capacities

CONCLUSIONS
Cessation of beach maintenance
Port development
Levels of reserves
Use of inland waterways
Air supply
Exploitation of local resources
Preshipment of organizational equipment
Transportation needs
Locomotives and rolling stock
Bulk POL facilities
TC truck companies
Operating personnel
Signal communications
Cancellation of airborne operations
Barges and tugs
Service troops and labor

LOGISTICAL POLICIES
General
Port development
Rail development
Coal production
Civil relief scales
Use of service troops, local labor, PW, and tactical troops for logistical purposes
Reserves in forward areas
Exploitation of local resources
Airfield construction
Responsibility for ports and lines of communication

LOGISTICAL PLAN
Allocation of ports
Development of advanced bases and forward depot areas
Development of lines of communication
Administrative boundary
Emergency supply measures

ANNEXES AND MAPS

ANNEX 'A'—SUMMARY OF MANEUVER (prepared by G-3)

'B'—TOPOGRAPHY AND COMMUNICATIONS (prepared by G-2)

General	Major obstacles of terrain
Roads	Water supply
Railroads	Depot sites
Inland waterways	Accommodation
Airfield sites	Enemy logistical installations
Ports	

*'C'—ESTIMATED PORT CAPACITIES

*'D'—MAINTENANCE AND RESERVES FOR GROUND FORCES

*'E'—MAINTENANCE AND RESERVES FOR AIR FORCES

*'F'—TRANSPORTATION TONNAGES (incl Railway Construction, Port and Railway Operating and Workshop, and Port Construction and Repair)

*'G'—ENGINEER TONNAGES (incl Road Construction and Maintenance, Bridge Materials, Water Supply, Airfield Construction, Building Materials, Bulk POL Construction, industrial gases, etc)

*'H'—COAL REQUIREMENTS (incl Train heating and warming, Hospitals, Railways, Workshops, and Minimum Civil Relief)

*'I'—ORGANIZATIONAL EQUIPMENT (preshipped and accompanying)

*'J'—CIVIL RELIEF (other than coal)

*'K'—MISCELLANEOUS SMALL REQUIREMENTS (incl Navy, Red Cross, RAMP, PW, DP, USO, Press, etc)

*'L'—BULK POL

*'M'—LOCAL RESOURCES (incl coal, Construction Materials, local farm produce, and local manufacture for military use)

*'N'—CONSOLIDATED TONNAGE TABLE (developing both gross and net requirements for import)

*'O'—RESERVES TO BE ACCUMULATED IN FORWARD AREAS PRIOR TO MAJOR OFFENSIVES

*'P'—MILEAGE CHART (mileages between principal locations in Zone of Advance)

MAPS

'Q'—PHASE LINES AND ADMINISTRATIVE BOUNDARY

'R'—MAIN TRUCK ROUTES

'S'—PRIMARY RAILROADS

'T'—PIPELINES

'U'—NAVIGABLE INLAND WATERWAYS

'V'—ADMINISTRATIVE AIRFIELDS

'W'—DEPOT AREAS

'X'—KNOWN ENEMY LOGISTICAL INSTALLATIONS

* —Annexes C to P are presented as tables.

CHART 13.

LIST OF ADMINISTRATIVE INSTRUCTIONS ISSUED BY COSSAC (SUPREME ALLIED HEADQUARTERS)

COSSAC issued 12 Administrative Instructions under the heading SUPREME ALLIED HEADQUARTERS (in anticipation of arrival of General Eisenhower, who later desired the headquarters known as SUPREME HEADQUARTERS, ALLIED EXPEDITIONARY FORCE):

No. 1—ADMINISTRATIVE STAFF
(based on Part II of COSSAC Administrative Appreciation: The System of Administrative Control and Liaison)

No. 2—*THE LINES OF COMMUNICATION / COMMUNICATIONS ZONE*
(based on Part I of COSSAC Administrative Appreciation: Administrative Layout of the *L of C*/ Communications Zone)

No. 3—*A / G-1* SERVICES

No. 4—ENGINEER SERVICES

No. 5—*PETROL, OIL, AND LUBRICANTS / CLASS III SUPPLIES*

No. 6—*ACCOMMODATION / SHELTER*

No. 7—GPA AND LABOR

No. 8—MEDICAL

No. 9—*SUPPLIES AND TRANSPORT / QUARTERMASTER AND ORDNANCE AND REME / ORDNANCE SERVICES*

No. 10—*MOVEMENT / TRAFFIC*

No. 11—TRANSPORTATION *STORES / CLASS IV SUPPLIES*

No. 12—MISCELLANEOUS
(covered weights and measures, levels of reserve, anti-gas equipment, offensive chemical equipment, salvage, disposal of captured matériel, firefighting, reports, etc)

(Instructions Nos. 3 to 12 inclusive were based on Part III of COSSAC Administrative Appreciation: Policy and Methods to be Employed in all Administrative Matters of Common Concern to British and US Army Groups.)

CHART 14.

improving or developing the necessary logistical planning factors. These visits were periodically reciprocated and tended to foster congenial personal relationships among the theater logistical planners.

The logistical planners of COSSAC and SHAEF sat with the strategic operational planners for the critical review of the operational plans of subordinate headquarters. In the case of plans and policies that were entirely logistical in nature, the COSSAC and SHAEF logistical planners of themselves consolidated and returned critical comment on, and required revision of, the plans or policies originally submitted.

The Planning Staff of COSSAC and SHAEF was under the direct supervision of G-3 and consisted of representatives of the G-3 (Plans) section, the G-2 (Plans) section, the Naval Plans section, the Air Plans section, the G-4 (Plans) section, and such other planning agencies, including the several services represented at COSSAC or SHAEF, as might be necessary. In the earlier days of planning, when operational requirements were paramount, the operational planners, guided generally by G-2 and G-4, would conceive a plan after which it then became the task of the G-4 planners to test this plan for logistic feasibility and to outline a logistical plan for its support. However, during the later phases of post-*Overlord* operations, when strategy was well manifest in the course of operational events and logistical limitations became more critical, a planning conference was usually opened with the question posed to the G-4 planner, "What can we do logistically?"

The G-4 planner attending the meeting had to be prepared to reply essentially in terms of the numbers of divisions which could be supported forward of railhead at so-many miles. For example, in planning for operations across the Rhine in October 1944, the logistical planner's reply to this question was:

"By the end of that month, logistical facilities would be adequate to support the Twenty-first Army Group and 20 divisions of the Twelfth Army Group in combat short of the Rhine and sufficient reserves would have been accumulated to support 10 of the 20 divisions of Twelfth Army Group across the Rhine immediately. Or, there were sufficient supplies on hand to maintain a total of some 25 US divisions short of the Rhine on a hand-to-mouth basis without further accumulation of reserves. Furthermore, not until Antwerp was captured and put into use would logistical reserves be adequate for the support of large-scale operations across the Rhine."

When actual operational developments or a new concept of strategy required that G-4 planners write a new administrative appreciation on the basis of which to transmit revised strategic guidance to the major commands, the G-4 planner asked the G-3 planner first to produce what was called a Planning Forecast. These planning forecasts were brief outlines of future operations as foreseen at that time. They consisted of a simple sketch-map on which phase lines at 30-day intervals were drawn, the predicted dates of capture of major ports were given, and the approximate disposition of forces in terms of divisions was indicated. There also was a brief summary in writing of the nature of operations during each of the phases indicated, with a notation as to whether normal combat, regrouping, or rapid advance was expected to be in process. On the basis of these forecasts, G-4 was able then to produce the administrative appreciations described above.

G-4 planners collaborated with the G-3 planners in reviewing, examining, or otherwise studying plans conceived by lower headquarters. At times, they even formulated plans in tactical detail when the over-all success of strategy depended for the moment on immediate tactical success. An impressive illustration of how

OUTLINE OF SHAEF TONNAGE ALLOCATION STUDY
SHAEF TONNAGE ALLOCATION NO. --------
TO COVER PERIOD ---------- TO ----------

OBJECT
("------to approve requirements of tonnages between the various agencies concerned for the period ---------- to ---------- inclusive, on which allocation of transportation resources can be made prior to ----------.")

SECTION I—PROJECTED OPERATIONS

ORDER OF BATTLE
(showed present and projected composition of armies by type divisions for period under consideration)
SUMMARY OF MANEUVER
(forecast front line at beginning and end of period using an attached map and summarized contemplated operations by each army)
RATE OF ADVANCE
(predicted average rate of advance in miles per day during period; for each sector if different)
TACTICAL PRIORITIES
(indicated relative operational activity of armies)
ENEMY, TERRAIN, AND WEATHER
(in chart form compared obstacles opposing the several armies)

SECTION II—SUMMARY OF CURRENT SUPPLY POSITION

(For each Army Group briefly reviewed status of supply in each class and compared relative supply status of Army Groups in a chart.)

SECTION III—BIDS OF ARMY GROUP AND COM Z

(Stated and analyzed the bid for tonnages submitted by each Army Group and Com Z, concluding with a recommendation for approval or amendment.)

SECTION IV—ESTIMATED CAPACITIES OF LINES OF COMMUNICATION

(Reviewed average daily tonnages delivered by lines of communication to each Army Group during preceding month, noted any prospect for improvement or deterioration, and concluded with an estimate of what could be done during the period under consideration.)

SECTION V—LOGISTICAL ESTIMATE OF THE SITUATION

ANALYSIS AND COMPARISON OF BIDS AND ESTIMATED CAPACITIES
(Chart developing surplus or deficiency for each agency)
CONCLUSION
(Indicated where logistical support should be emphasized and indicated how much of the capacity of lines of communication behind the Army Groups with a surplus should be shifted to the support of that Army Group with a deficiency)
IMPLEMENTATION
(Indicated what reallocation of transportation resources might be necessary and what logistical expedients should be utilized to effect the shift of logistical support to the Army Group requiring it with highest priority)

SECTION VI—RECOMMENDATION

(Recommended action to be taken to achieve proper logistical support during period considered and transmitted findings and allocations of tonnages to Movements and Transportation Branch for final executive action.)

(SHAEF Allocations of Tonnages Nos. 1, 2, and 3 are microfilmed on 35mm film, AG Microfilming Job Number 600-12, Reel 1 of "Historical Documents World War II")

CHART 15.

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the G-4 planner cooperated with the G-3 planner in reviewing a plan presented by lower headquarters is found in a plan submitted by First Allied Airborne Army for Operation *Arena*.

The plan for *Arena* envisaged landings by 4 to 6 airborne divisions in the Kassel area, followed immediately by the landing of 5 to 6 air-transported divisions. The entire force was to be landed during the period of 1 week and to be sustained by air supply for up to 21 days. The object of this plan was to effect an early penetration into the heart of Germany and thereby to establish an airhead from which offensive operations could be conducted either for the capture of Berlin or for the assistance of either the northern or the southern prong of the pincers that would encircle the Ruhr. The G-4 logistical planner, after detailed study of the logistical aspects of this operation, concluded that it was logistically unsound. Although admittedly bold, the plan was too risky in that the security of its forces was predicated on logistical success in every

minute and complex detail without a margin of reserves or other measure of safety. The G-4 logistical planner accordingly recommended that the plan be disapproved.

As an illustration of how the G-4 planner assisted the G-3 planner at SHAEF in detailed tactical planning, an operation called *Lucky Strike*, conceived by SHAEF about 20 June 1944, was designed to accomplish in effect the same objective as that of the more elaborate and better plan for Operation *Cobra*—the operation for breaking out of the Normandy beachhead area. This operation was developed to the minutest logistical detail within the G-4 (Plans Branch) SHAEF.

G-4 (Plans) SHAEF periodically cautioned the G-3 planners against moves that were ill-advised from a logistical standpoint. For example, although an early capture of the city of Paris might appear desirable for political and psychological reasons, the G-4 planners argued that the civil affairs commitments entailed in subsisting the city after its capture would be equivalent to supporting eight US divisions in combat.

Conclusions

It would appear, then, that the functions of strategic logistical planning are the following:

Generally, to direct, and where necessary, to dictate, the course of strategy;

To assist in determining the basic decisions of strategic plans: attack or defense, objective area, target date, axis of advance, and relative disposition of major forces;

To designate the base and to guide the development of the lines of communication from which logistical support will be provided;

To plan the concentration and the mounting of the forces engaged in the operation;

To devise logistical expedients upon which the success of over-all strategy may depend: artificial ports, bulk POL facilities, landing devices, and rapid rehabilitation of ports and communications;

To assist in insuring the successful execution of the strategic plan by planning the provision and control of large-scale emergency logistical measures: supply by air, reserve supplies, pre-packed or pre-loaded supplies capable of expeditious delivery to critical areas by surface or air transportation, and the crash-landing of ships and aircraft;

To provide the long-range basis for procurement action and, in part, the long-range basis for troop flow, project planning, and the allocation of manpower and matériel;

To provide the basis for the allocation of critical logistical resources either on a long-range or current scale: port capacities, transportation, air supply, controlled items of equipment, and service troops;

To provide the basis for, and to coordinate, the logistical planning of subordinate headquarters;

To study in detail the logistical implications of operations which, although strategic in concept, are dependent for a critical moment on total tactical success: amphibious operations, river crossings, capture of ports and major cities;

To adjust the long-range logistical plan to current developments when the latter require special logistical expedients to exploit them or emergency measures to support them, and to readjust logistical arrangements or reallocate logistical resources accordingly;

To develop outline logistical planning factors in order to coordinate and facilitate logistical planning at all levels.

It would further appear that the best medium for transmitting strategic guidance is the Strategic Logistical Study, incorporating a logistical estimate with a logistical planning directive.

The validity of strategic logistical plan-

CHART 16.

POST-OVERLORD OPERATIONS PREDICTED AND ACTUAL PHASE LINES

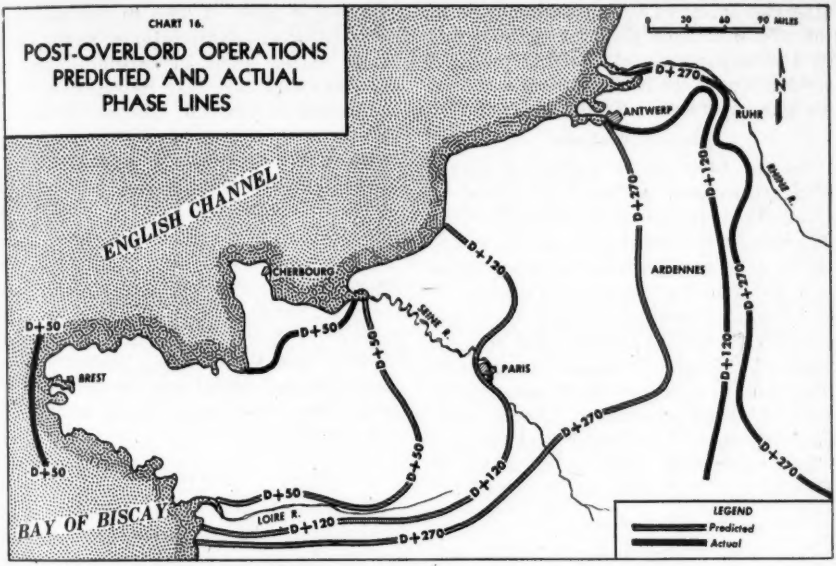


CHART 17. PLANNED PORTS

PORTS	CAPTURE DATE		CAPACITY			
			D+30		D+60	
	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL
OMAHA	D	D	6000	12000	5000	10000
MULBERRY "A"	D	D	5000	—	5000	—
ISIGNY	D	D	500	500	500	1300
GRANDCAMP	D	D	300	500	300	900
UTAH	D	D	4500	8000	4000	6000
ST. VAAST	D+2	D+17	1100	—	1100	1300
BARFLEUR	D+6	D+17	1000	—	1000	640
CHERBOURG	D+8	D+21	6000	—	7000	5600
GRANVILLE	D+17	D+57	700	—	1500	—
ST. MALO	D+25	D+73	900	—	2500	—
BREST	D+50	D+103	—	—	1800	—
RADE DE BREST	D+50	D+103	—	—	1440	—
LORIENT	D+50	—	—	—	800	—
QUIBERON	D+40	—	—	—	4000	—
ST. BRIEUIC	D+40	D+69	—	—	—	—
MORLAIX	D+50	D+69	—	—	—	—

ning can be tested by examining some of the effects of such planning in ETO and by comparing some of the forecasts and assumptions of the ETO strategic logistical planners with actual developments.

Theater Projects

On the basis of an outline of future plans formulated in logistical terms by COSSAC in late May 1943, SOS ETOUSA was able for the first time since its organization a year previously to have reasonable guidance for some 155 Projects for Continental Operations (PROCO). These included the studies and resultant requirements for Class IV supplies, and were completed in time for use in the first 90 days of actual operations. Com Z eventually prepared 219 theater projects with 113 revisions, all based on COSSAC or SHAEF administrative appreciations.

Predictions

Logistical planners at SHAEF concluded in May 1944 that US forces must halt and stand fast for a period of 1 month west of Paris until rail lines through Normandy could be developed for their support. This conclusion was, of course, based on the forces halting with basic loads intact. General Patton's halt of the Third Army somewhere between 150 and 200 miles farther east of the predicted line, with basic loads exhausted, represents exactly the predicted condition, excepting that it was in more poverty-stricken terms. (One of his tanks carried enough fuel in its basic load to travel about 150 to 200 miles.)

The predicted phase lines of the Planning Forecasts, on which the SHAEF administrative appreciations were based, compare unfavorably with the actual front lines at the same dates (see Chart 16). On the other hand, SHAEF planners deduced that the European campaigns should be concluded by about D+330, whereas in fact VE-day was D+337!

The predicted dates of capture of certain major ports as used in the SHAEF administrative appreciations were generally earlier than the actual dates of capture (see Chart 17). However, in partial compensation, the beaches developed greater capacities earlier and continued to be operable longer than was anticipated.

The forecast build-up and the actual build-up of US forces on the Continent compare most favorably, the discrepancy being not in excess of one division at any time up to D+210, when the effects of an increased and accelerated build-up arranged in late 1944 began to become evident (see Chart 18). Similarly, the predicted and actual tonnages to be imported were close, even as late as D+330 (see Chart 19).

Errors

Nevertheless, the ETO strategic logistical planners did make some major errors, the gravity of which has not yet been—maybe can never be—evaluated. Failure of US and British procurement to provide in time the additional landing craft necessary for the increased lift required by the modified COSSAC plan resulted in a 1 month's delay of D-day. During that month, May 1944, Channel weather was continuously the best it had been for nearly 40 years, whereas, in June 1944, a month later, it became the worst experienced in a similar period.

It was this bad weather in June that demolished the American *Mulberry*, with the result that large quantities of US supplies lay off-shore of the beachhead but could not be landed, and the stocks ashore became inadequate to support the large-scale effort desired by the Americans. Moreover, it was during May that the Germans moved into the Cotentin Peninsula the additional division that must have been instrumental in helping delay the capture of Cherbourg. Finally, it was in May that the Germans sowed in the Cherbourg Channels the new-type "oyster"

COMPARISON OF FORECAST AND ACTUAL BUILD UP OF US FORCES BY PHASES OF POST-OVERLORD OPERATIONS

DATE	*FORECAST BY SHAEF*		*ACTUAL*
	Adm Appreciation No. 1	Adm Appreciation No. 2	
D+ 60	18	—	18
D+ 90	21	—	21
D+120	27	—	27
D+150	34	37	34
D+180	39	41	39
D+210	44	45	48
D+240	48	55	52
D+270	52	59	54
D+300	52	59	57
D+330	52	59	61
D+360	52	—	61

(in terms of Divisions)

CHART 18.

COMPARISON OF FORECAST AND ACTUAL US TONNAGES IMPORTED ONTO CONTINENT BY PHASES OF POST-OVERLORD OPERATIONS

DATE	*FORECAST BY SHAEF*		*ACTUAL*
	Adm Appreciation No. 1	Adm Appreciation No. 2	
D+ 60	30,711	—	27,645
D+ 90	37,627	—	27,998
D+120	38,642	—	24,900
D+150	47,853	41,543	22,512
D+180	51,239	51,790	48,804
D+210	54,509	66,675	52,876
D+240	53,621	71,398	39,030
D+270	55,290	60,768	54,309
D+300	—	61,235	62,756
D+330	—	—	
D+360	—	—	

(in terms of average long tons per day)

CHART 19.

mines that defied clearance long enough to delay the opening of the port considerably beyond the target date. Consider what might have been the course of the European campaign had the US *Mulberry* been operating throughout May.

The US logistical planners of SHAEF in pre-D-day studies concluded that the early capture of the port of Brest was desirable and essential for the development of the Brittany peninsula as a huge US staging area for troops and equipment arriving direct from the US. It was this concept that dictated that, even though Cherbourg eventually promised to develop more than the anticipated capacity and though the rail communications with Brest were limited, Brest should be taken at all costs. As a matter of fact, many US divisions were staged in England long after the time deemed desirable or practicable for doing so, with the consequence that the considerable effort diverted to the prolonged investment and eventual capture of the destroyed port of Brest may have been largely misspent.

The SHAEF logistical planners were probably in error not to have insisted more emphatically that a definite decision be made as to which US Army, First or Third, would receive the preponderant logistic support in late August 1944, when Patton was sweeping south and east of Paris. As it was, SHAEF tried "to eat its cake and have it too" by attempting to support Third Army almost to the degree it desired (which was logistically and maybe even strategically unsound), and also to support adequately the less spectacular but equally significant operations of First Army.

The logistical planning of *Overlord* was based on the assumption, among others, that rail lines of communication could be developed to keep within 150 miles of combat divisions. Requirements for truck

companies, road and bridge construction and maintenance units, and automotive repair units were all computed on this basis. No alternate plan, as was later prepared (the so-called XYZ Plan) to support a possible rapid advance east of the Rhine, was made in anticipation of an advance at the rate at which Plan *Cobra* uncoiled. This omission proved later to be an error in logistical planning, from which the strategic logistical planners learned one of the lessons that were to be of great aid to them in providing the support of the Rhine crossings and subsequent operations in Germany.

By the time the Allied armies came abreast of the Siegfried Line, the logistical support, furnished primarily by long highway haulage, was running down. The Red Ball turnaround was stretched almost to the breaking point. The neglect of maintenance, which had been necessary to exert the all-out effort, was beginning to take its toll. Driver fatigue was causing increasing numbers of serious accidents. Combat troops whose vehicles and drivers had been diverted to lines of communications tasks were being moved into the combat zone.

The US Armies needed to roll up their administrative tail and to open a more advanced base. Antwerp would be the answer. The port had been captured intact in late September and it remained only to clear the islands of the Scheldt of scattered German units and to sweep the mines from the approach channels in order to begin operation of the port at a large import figure. But the British, in whose operational area the port and its approaches were geographically located, had no immediate personal interest in diverting effort to opening the port. The British commander seemed to prefer to look toward Berlin, despite repeated SHAEF directives that he give highest operational priority to the clearing of the Scheldt. Presumably, his own logistical planners did not appreciate the great need for Antwerp and its proffer of general benefit to the Allies once the US Armies could base their maintenance on it.

Perhaps if SHAEF G-4 Planners had been more influential in convincing their opposite numbers at Twenty-first Army Group (British) of the logistical urgency of opening Antwerp, Field Marshal Montgomery might have been dissuaded from his inclination to disregard the SHAEF directives. The consequence would have been not only that inter-Allied relations would not at the time have been strained, but the over-all logistical situation might have been rescued at its most crucial period. At it was, Antwerp was not opened until 28 November.

The SHAEF strategic logistical planners were wrong again to have been satisfied in early 1945 with Twenty-first Army Group's verbal assurance that its logistical plans for the support of the British and Canadian forces north of the Ruhr in the spring offensive were adequate and need not be reviewed by SHAEF. G-4 SHAEF acceded to this in the interests of international diplomacy. As events developed, British logistical resources across and east of the Rhine were miserably inadequate, and large portions of US-developed capacities had to be diverted to the support of the British Army. In fact, had the surrender not occurred at a time it did, when Twenty-first Army Group was not yet committed to entering Denmark in force, the British would have been embarrassed to find themselves unable logistically to support an operation into that country to mop up the residual German units there.

Following VE-day, the US forces which had entered Austria from the Mediterranean Theater were closely linked to the US forces in Bavaria and might have been most economically supported logistically over the same lines of communication by which Third and Seventh US Armies were supported. However, because no general

ORGANIZATIONAL AND FUNCTIONAL CHART OF PLANS DIVISION, G-4 COM Z ETOUSA

PLANS DIVISION

1 COLONEL

1. Direct and coordinate work of Division.
2. Liaison with SHAEF Log Plans, Army Groups, Com Z Sections, and Com Z Staff Sections on planning matters.

CURRENT PLANS BRANCH

1 LT COLONEL

1. Preparation of plans required for logistic support of current operations. Maintain liaison with other General and Special Staff Sections of Hq Com Z to accomplish this end.
2. Preparation of such logistical studies and estimates of the current situation as may be required by proper authority.
3. Recommend locations of boundaries and changes in administrative organization of Com Z from a supply standpoint.
4. Compilation of such current and up-to-date logistical data as may be required for operation of the branch as a whole.

LONG-RANGE PLANS BRANCH

1 LT COLONEL

1. Analysis of long-range plans laid down by higher authority and determination of their effect upon Com Z operations from a supply standpoint.
2. Preparation of long-range supply plans.
3. Maintain liaison with SHAEF, other headquarters concerned and with other General and Special Staff Sections of Com Z to insure that all possible information is available for planning purposes.
4. Preparation of such planning instructions and directives as may be necessary for issuance to acquaint all concerned with future action that may be required.
5. Preparation of studies of future requirements and the necessity for advance procurement of such requirements from the Zone of Interior.

REDEPLOYMENT BRANCH

1 MAJOR

1. Maintain close contact with the over-all redeployment planning section to insure that the latest policies and directives are available to it.
2. Preparation and issuance of such detailed planning instructions or directives concerning redeployment as may be required to implement redeployment from a supply standpoint.

CHART 20.

ORGANIZATIONAL AND FUNCTIONAL CHART OF PLANS BRANCH, G-4 USFET

PLANS BRANCH

1 COLONEL 1 MAJOR*

1. Direct and coordinate work of branch.
2. Present oral briefs to ACofS, G-4.
3. Serve as member of Planning Staff.
4. Maintain liaison with Com Z and Army Groups logistical planners.
*5. Perform office administration including supervision of typists and draftsmen and final proofreading of outgoing documents.

FUTURE PLANS SECTION

1 LT COLONEL 1 MAJOR

1. Compile Administrative Appreciations.
2. Provide strategic guidance in logistical planning to Com Z and Army Group.
3. Coordinate forecasts of future buildup of forces and tonnages and of future transportation capacities as bases of long-range logistical planning.
4. Review logistical plans and logistical aspects of operational plans of Com Z and Army Groups.
5. Plan with G-4 (O+E) the future logistical organization of the theater.

CURRENT PLANS SECTION

1 LT COLONEL 1 MAJOR

1. Prepare estimates of current logistical situation as required.
2. Adjust long-range logistical plans to current developments and coordinate reallocation of logistical resources as necessary.
3. Provide other branches of G-4 with logistical bases for current allocations of supplies, service troops, and transportation means.
4. Post the G-4 Situation Map in the office of ACofS, G-4.
5. Adjust administrative boundaries as necessary between major commands.

STATISTICS SECTION

1 CAPTAIN 1 LIEUTENANT

1. Collect, collate, and analyze logistical data.
2. Maintain logistics reference library.
3. Develop outline logistical planning factors.
4. Check all arithmetical computations used in studies.
5. Publish as required statistical studies of past operations.

CHART 21.

appreciation of the logistical situation had been prepared in advance—it would have had to be a SHAEF Administrative Appreciation No. 3 prepared in March 1945—early commitments were made to accept civil affairs and troop movements tonnages between Austria and Germany. Only later was it discovered that this prejudiced the most efficient logistical support of the US Army Forces in Austria (USAFIA).

G-4 (Plans Branch) SHAEF had been unable during the fluid phases of pre-VE-day operations either to stabilize its own deliberations on the future logistical situation or to obtain from G-3 SHAEF the new Planning Forecast that would have been necessary for the preparation of this third appreciation. The rapidly changing situation eventuated without a logistical pattern on which to base a short-range estimate of its logistical implications.

Thus, it is seen that strategic logistical planning can be valid and quite consistent with realities. Strategic logistical planners can make serious errors which they must be continuously on guard to detect and correct. Most important of all, strategic logistical planning has emerged as more nearly a science than an esoteric art and as a definite and dependable means of providing an early basis for the procurement of matériel and the activation and training of service units which must anticipate operations by at least 1 year.

Based on the principles of theater organization enunciated above and on the functions of strategic logistical planning enumerated above, it would appear that a suitable and effective organization of a G-4 Plans Branch at Theater of Operations or combined headquarters level would include the following:

Long-range planning section;
Short-range planning section;
Statistics section.

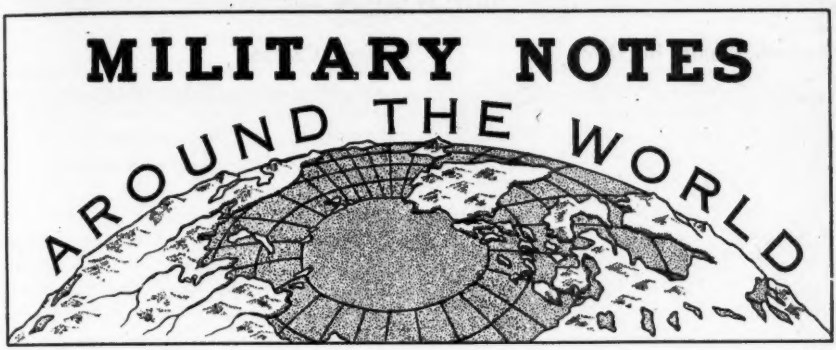
The long-range planning section would study and develop the basis for procurement planning, project planning, and the provision of service troops. The short-range planning section would adjust the long-range logistical plan to more nearly current developments, making such readjustments as are necessary by reallocating logistical resources or by devising temporary logistical expedients, such as the diversion of bombers to supply. The statistics section would develop and revise outline logistical planning factors; by their very nature these factors are different from the planning factors used in more detailed planning and the derivation of which should be reserved to the strategic logistical planners as a peculiar skill.

An organization generally along the above indicated lines was used at Com Z ETOUSA after its consolidation with SOLOC (see Chart 20), and at SHAEF and its US successor, USFET (see Chart 21). With such an organization as a framework, and with the three essentials of good staff organization—efficient staff officers, efficient staff procedures, and effective staff data—the strategic logistical planners should not fail to insure that logistics will never impede tactics. Logistics may limit strategy, but if it is organized as described above, it will also often be a source of the surprise, boldness, and speed that strategy seeks for success.

The success of administrative planning depends on the ability to foresee needs. Therefore, the commander in chief must always keep his staff posted with regard to his future intentions, in order that administrative preparations may be completed in time.

Field Marshal Viscount Montgomery

MILITARY NOTES AROUND THE WORLD



UNITED STATES

Jet Metals and Fuels

Research scientists are grappling with two problems that might limit seriously the number of jet warplanes this nation could build and operate in an emergency.

The first problem is strategic metals that go into jet engines. The second is a sufficient supply of fuel.

At least five strategic metals that go into the current jet power plants are in critical supply, and the work of many engineers at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics in Cleveland is dedicated toward finding efficient substitutes.

The chief metallic elements that are not available in this country in supply to match or even approach the production mark for aircraft engines in World War II are columbium, tungsten, cobalt, chromium, and nickel. NACA engineers said there were other metallic elements in short supply but did not name them.

The over-all aim of the research scientists at the $60,000,000 Lewis laboratory is to develop suitable substitutes from materials found or produced in the Americas, or materials that are in such ample supply throughout the world that they can be stockpiled.

In the search for alternate materials, the metallurgists have made a small contribution to etymology. One substitute material that has shown great promise thus far in the experiments is a combination of metal and ceramics and to this has been given the name "ceremals."

The chief technical flaw in "ceremals" is a brittleness that may soon be overcome. The new materials will withstand higher temperatures than the metals they are meant to supplant, but, unlike the metals, they break and crack.

Scientists also are working for designs that will call for smaller amounts of strategic materials in short supply. A third approach is in improved cooling methods that will make the more available alloys equal to the task.

The fuel problem for jet engines is being approached from much the same angle—substitutes are being sought for kerosene. At the present time, a barrel of crude oil, when refined, gives only 6 percent kerosene. This would not be enough to feed the many hungry jets needed in time of war.

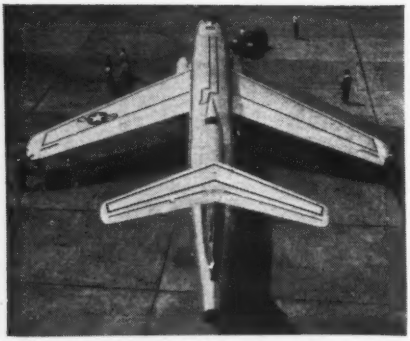
Mixtures of other fuels are being tried, such as those called JP-1 and JP-3, but the NACA heads reported that the search continues.—*The New York Times.*

Ground-Support Bomber

The Air Force announced recently the completion of an experimental jet bomber, the *XB-51*, which was designed to answer the Army's demand for more emphasis on tactical air support of ground forces.

Built by the Glenn L. Martin Company of Baltimore, the *XB-51* has an 80-foot fishlike fuselage with wings swept back at a 35-degree angle. Two powerful turbo-jet engines are mounted beneath the fuselage just forward of the wings, and a third turbo-jet is in the tail.

It is the first three-engine jet plane built and the first postwar bomber specifically designed for tactical support of ground forces.



The *XB-51*, designed for ground support.—Department of Defense photo.

Expected performance characteristics are still secret, but the sharply streamlined design indicates that the bomber will operate at speeds above 600 miles an hour. The plane carries a crew of two.

The Air Force hopes it will answer the need for a fast, short-range plane that can be used for light bombardment and strafing of enemy troop columns in support of ground forces.

The *XB-51* has a wing span of 55 feet and is 17 feet high. Both the wings and tail assembly are swept back.—*The New York Times.*

Atomic Course

An orientation course on all military phases of atomic energy is being given commanders and staff officers of Army commands in the United States and overseas, the Department of the Army announced recently.

The courses are conducted by Armed Forces Special Weapons Project teams composed of Army, Navy, and Air Force officers who are specialists in the field of atomic energy. The orientation courses are being given at the various command headquarters. These include six Army Areas in this country and six overseas commands.

The program for Army officers attending the course includes: Organization and Military Application of Atomic Energy, Atomic Bomb Effects, Medical Aspects of Atomic Explosions, Radiological Defense and Radiological Defense Logistics, and Atomic Power Development.

The program constitutes one phase in a series of atomic orientation courses which will ultimately be extended to all Army troops.—Department of Defense.

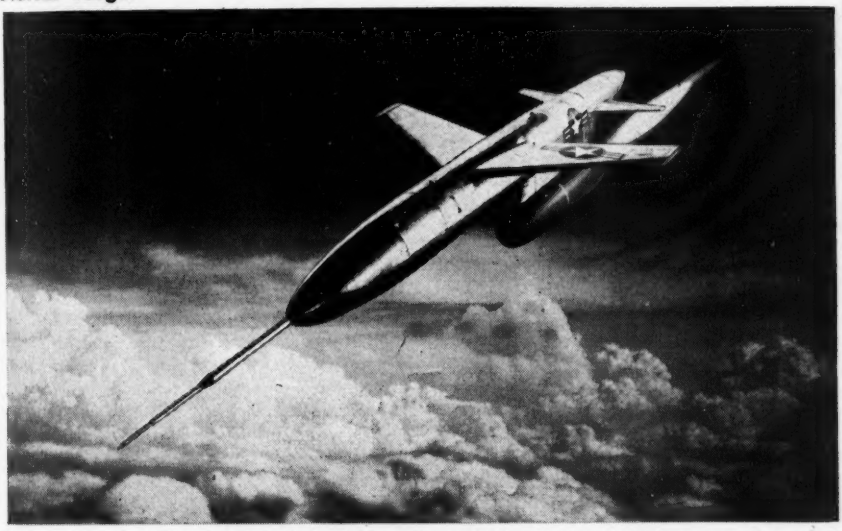
Arctic Oil

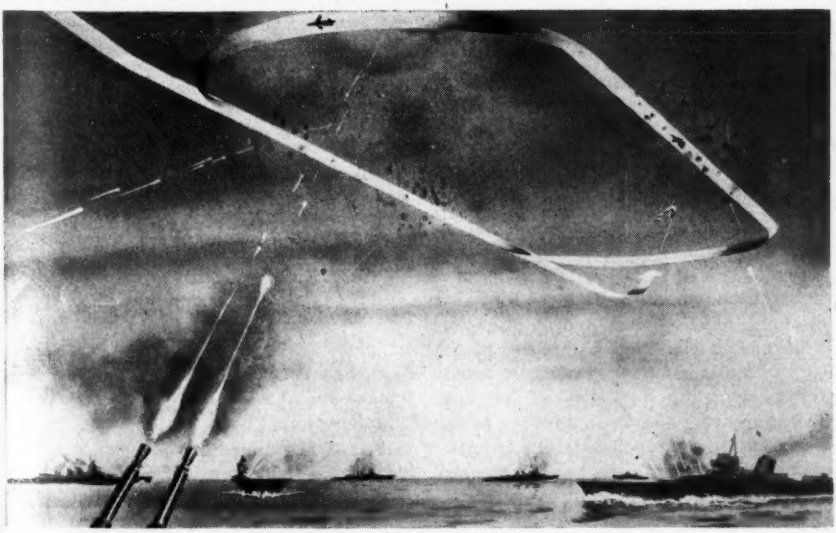
Discovery of new oil and gas deposits in the Arctic Basin that indicate reserves are "far more widespread" than expected, was reported recently by the Navy, which has been exploring the area for 5 years.

Describing the natural gas deposits as of "commercial quantity," the Navy said the products of a well drilled 6 miles south of Point Barrow already were meeting all fuel requirements for heating and cooking at its installations there.

The chairman of the Navy's Committee on Naval Petroleum Reserves reported that five deep wells had been drilled to date and three others were being dug. All have produced "shows" of oil and gas.—*The New York Times.*

Aerial Target





Navy gunners will soon test their skill against pilotless aircraft flying near the speed of sound and maneuvering like jet fighters. Targets will be a new version of the *Gorgon IV*, above, a radio-controlled drone powered by a ram-jet engine. Below, artist's concept of how the targets will be employed.—Department of Defense photos.

Helicopter Floats

A 10-place Piasecki *HRP-1* helicopter has been outfitted by the US Coast Guard at Elizabeth City, North Carolina, with specially-made nylon floats which permit the craft to set down easily on the water for emergency rescues. The *HRP-1* weighs more than 3 tons. The all-weather floats are neatly folded around the wheels until

needed. The pilot pulls a cord which releases carbon dioxide from a cylinder, "popping" the floats open in 90 seconds for a water, ice, snow, tundra, or swamp landing. The insert photo shows how compactly the floats fold around the *HRP's* landing wheels.—Piasecki Helicopter Corporation.

Turbo-Prop Engine

The US Air Force's newest turbo-prop engine—a propeller driving, gas turbine, aircraft engine—the Turbodyne XT-37-1, has been installed in a Northrop *YB-35* Flying Wing, for flight evaluation tests.

The Turbodyne engine utilizes the shaft power of a gas turbine to drive a propeller. Because of the inherent high speed of the gas turbine, reduction gearing is necessary to drive the propeller at its most efficient rotating speed. In addition to the advantages of a propeller-driven aircraft, the turbo-prop has a higher horsepower per engine-pound ratio than a reciprocating engine.—Department of Defense.

New Field Ration

Improvements in non-perishable food items since VJ-day are represented in the latest type of combat rations developed by the Quartermaster Corps and now being procured for use in field operations.

Officially designated the "Ration, individual, Combat, C-4," the new ration, intended for individual feeding of troops separated from the kitchens of their units but available for re-supply, has been shown by troop tests to be superior to the C ration of World War II.

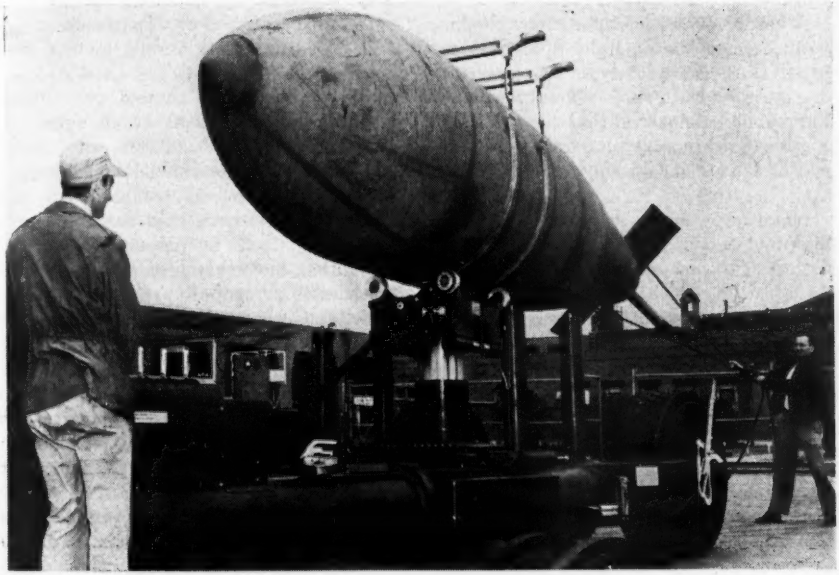
The C-4 ration consists of six different menus packed in a container weighing 40 pounds. The package is suitable for delivery to troops by air, truck, pack-animal carry, or man carry. A wide variety of meat, vegetable, and fruit items are included in the six menus, together with accessory items and cigarettes.

The food items are the best that have been developed to date by the Quartermaster Corps research program in foods and containers. The components rate high in utility, stability under prolonged storage, and nutritional adequacy. They have been found to be highly appetizing and acceptable to the troops. Each menu contains a minimum of 3,800 calories and is well balanced as to carbohydrates, fats, proteins, and vitamin content.

Three plastic spoons are issued with each ration. These spoons are sterilized and sealed in cellophane wrappers and it is intended that they be thrown away after using once. This is to insure against dysentery which sometimes resulted from the use of utensils carried by troops without facilities for proper cleaning.

A full package of 20 cigarettes is included in each menu. Synthetic beverage powders have been replaced by soluble coffee fortified with ascorbic acid for vitamin supplementation. Slab-type chewing gum has been displaced by the candy-coated type.—Department of the Army.

Bomb Hoist



The mobile bomb hoist shown above is capable of lifting a 50,000-pound bomb 12½ feet up into the bomb bay of an Air Force bomber. It is being tested by its builder, the Boeing Aircraft Company. The lift enables one man, operating six levers on the carriage, to raise the bomb into the bomb bay of an airplane. The hydraulic lift, actuated by electric motors, rests on a wheeled carriage which can be used to transport the bomb from the storage area to the plane.—Department of Defense photo.

Silent Generator

An engine-generator set, so quiet that it can scarcely be heard 300 feet away, has been revealed by the US Army Engineer Research and Development Laboratories at Fort Belvoir, Va., where it was designed and constructed. Its silence is due largely to a glass-wool-lined box in which it is enclosed.

Noise-making equipment in forward positions in time of war is easily detected and spotted by enemy apparatus. The new engine-generator and its near sound-proof box was developed to meet this situation. On a typical, quiet summer evening, this set has an audible range of 325 feet from the rear, or exhaust side, and 200 feet from the front.

The box itself is of aluminum and weighs 93 pounds. Its circuitous air intake and exhaust ducts are lined with one inch of glass fiber cemented to the walls. The interior of the box has a 2-inch lining of the same material. Ventilation is assured by the design of the ducts. All the air entering the box is dispelled over the cooling fins of the engine. There is no air recirculation, and the efficiency of the unit is not measurably affected by the housing. The generator used is a 1.5 kw. unit.—*Science News Letter.*

FRANCE

Tank Developments

A corner of the veil of secrecy cloaking France's new 12-ton light tank has been lifted since the prototype was presented to experts of the Brussels Treaty Alliance. The public has learned that the armament of this machine is comparable in every way to that of the 40-ton German *Panther* tank.

Mounting a 75-mm cannon, with a very high muzzle velocity, this tank is powered with a 250 horsepower motor, the characteristics of which are still subject to change since various types currently are being tested.

A 36-ton medium tank powered with a 600 horsepower German Maybach motor and a 55-ton heavy tank also are being prepared for eventual mass production.

Totally new in every respect, the heavy tank currently is equipped with a 1,000-horsepower motor of the gasoline injection type that cradles the auxiliary engine in its bosom. The armament of the tank is said to be extremely powerful.—*The New York Times.*

INDIA

Infantry Journal

The Infantry School at Mhow, Central India, is now publishing a semi-annual magazine under the title of *The Infantry Journal.* The first issue appeared in July 1949. The announced aim of the new publication is to present "information on current military topics and to improve the military background of officers of the Army by promoting discussion and thought on military subjects, with special reference to the Infantry." Views expressed in the *Journal* are not official. Original articles are published, as well as articles from other military publications. There are also sections containing book reviews, notes about the Infantry School, and miscellaneous news and comments.

JAPAN

War Damage

Detailed statistics on Japan's war losses and casualties were issued by the Economic Stabilization Board in Tokyo recently. The report showed that Japan lost non-military assets of an aggregate value of $15,300,000,000 of which $3,200,000,000 represented damage through air raids and naval bombardment and $1,000,000,000 represented damage resulting from lack of repairs, voluntary demolition, and scrapping.

About 40 percent of Japan's urban areas were damaged, with 2,252,000 buildings totally destroyed, 695,000 in Tokyo alone.

Damage to war vessels involved 79 battleships, cruisers, and aircraft carriers aggregating 937,000 tons; 133 destroyers aggregating 215,000 tons; 131 submarines totalling 185,000 tons; and 72 small craft totalling 40,000 tons.

Industrial damage was expressed in percentages which included: steam power 30 percent, copper refining 22 percent, aluminum 24 percent, machine tools 25 percent, ball-bearings 20 percent, rollingstock 25 percent, automobiles 21 percent, ammonium sulphate 54 percent.

Loss of human lives was estimated at 1,850,000 (1,555,000 military), with the injured aggregating 7,990,000. Deaths in Japan proper numbered 668,000.—*Journal of the Royal United Service Institution.*

POLAND

Aircraft Industry

Poland's established aircraft industry is capable of producing planes for civilian and military aviation. Many factories have been constructed for the production of air frames and all types of motors.

The announcement came somewhat as a surprise to Western observers, since only Russian, Czechoslovak, and United States-built planes had thus far appeared on Polish airfields.—*The New York Times.*

GERMANY

Air Force

The scope of reported Soviet preparations to resuscitate a German air force as a unit within the East Zone German police organization was indicated recently in separate reports in two Western-licensed papers.

According to the United States-licensed *Abend*, the air corps will temporarily consist of 200 planes, comprising both old German models and the most recent types of Russian craft. The training of pilots, the paper adds, will be directed during the initial period by a former *Luftwaffe* officer, who deserted to the Russians during the war.

Simultaneously with the activation of this corps of pilots at Perleberg, *Abend* reports, a specialized training course is being opened at a former *Luftwaffe* field at Magdeburg for observers and bombardiers. In addition, a school for radio operators will be opened soon near Halle, on the Saale, it was reported.

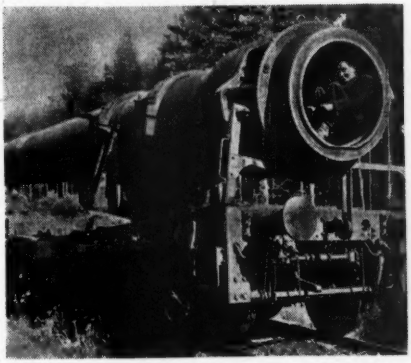
The maximum training period for pilots has been set at 6 months, *Abend* is informed. This period, the paper comments, corresponds to the emergency schedule set up by Goering in 1944 to reinforce dwindling *Luftwaffe* personnel.

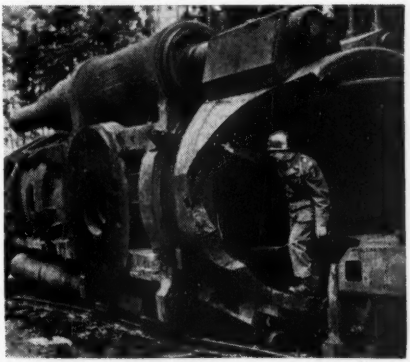
The British sector paper, *Sozial Democrat*, published a report that registration had been ordered of all East Zone police members who were formerly in the *Luftwaffe*, with details as to their service.

The data demanded cover particulars as to classification in the *Luftwaffe*—whether the men served as pilots, observers, radio operators, or air-gunners; whether the pilots handled bombers or fighters or were observer-pilots; the exact length of service with respective units and the approximate number of missions; and, in the case of ground personnel, the classification in antiaircraft, signal corps, etc.—*The New York Times.*

Heavy Railway Gun

The Germans have always been specialists in heavy long-range artillery. Among their major gun-making projects of World War II were two 33-inch railway guns. These were made by Krupp and one of





Above, the 100-foot-long barrel of the 33-inch railway gun which was to have reduced Gibraltar; below, the gun's immense breech and recoil mechanism.

them was actually used in the Crimean campaign.

The other gun and its two barrels was found near Munich and is being scrapped. With the barrels, the gun weighed 500 tons, and rested on a 40-axle railway carriage.—*The Illustrated London News.*

CANADA

Rain Repellent

A rain repellent for aircraft windshields has been invented by a member of the National Research Council of Canada.

Optical errors caused by rain on the windshield of an airplane are usually greater than the pilot realizes. Simulated flight tests with a water spray on a sheet of glass in a high-speed air current showed that the extent of these errors varies considerably with the size of water drops, the amount of water, the air speed, and the angle of the windshield. Tests further revealed that the average error is up to 5 degrees in angle in the line of vision, which means that a mountain peak ½ mile ahead of an aircraft flying through heavy rain might appear to be 200 feet lower than it actually is.

Application to the aircraft windshield of the wax preparation, FC-10 Rain Repellent, is an effective method of preventing these optical errors. On impact with the windshield, the drops of water are broken down by the repellent into tiny droplets which then pass off into the airstream. The droplets move so rapidly that they are quite invisible. The windshield thus appears dry and allows visibility that is free from distortions or ripples.

Visibility of 2 miles has been obtained through the treated area under conditions in which untreated areas allowed no vision whatever. The treatment has proved satisfactory at all air speeds, even in excess of 600 mph, and through heaviest rains.—*Canadian Army Journal.*

Glass Crash Helmet

A lightweight crash helmet made of glass wool and fiber glass has been developed by the Royal Canadian Air Force's Institute of Aviation Medicine for pilots in new high-speed jet aircraft. The hat is padded with horsehair and bound in chamois. The glass is coated with plastic paint.—*The New York Times.*

Maneuvers

Canada's largest peacetime air and land maneuvers along the first 50 miles of the strategic Alaska highway ended recently.

They produced both lessons and warnings for Canadian defense. The 3-day Exercise *Eagle* involved 1,400 army and air force officers and men who gathered from all over Western Canada to test abilities to cope with an airborne enemy attempt to seize the Fort St. John airfield.

The two chiefs called the exercise "one of the best things that has happened to the forces since the war."

The exercise was designed to test Canada's first regular airborne battalion, the Princess Patricia's Canadian light infantry, in an assault role, to exercise the Royal Canadian Air Force in support, to test staff work that has been 6 months in preparation, and to check the abilities of the Air Force to defend their base at Fort St. John.—News report.

Uranium Output

Canada's frozen north is yielding a rich harvest of uranium, most of it destined for the United States.

The Crown-owned Eldorado Mining Company disclosed in its annual report made public recently that it had extracted more than $1,000,000 worth of atomic energy raw material out of the Northwest Territories last year. This was stirring the company to new drilling activity in Northern Saskatchewan.

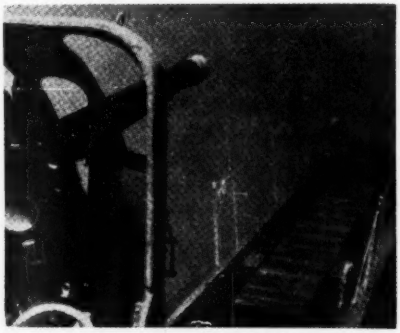
Most of the uranium, the report said, was shipped to the United States market.

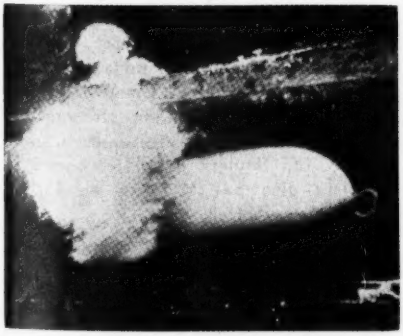
Through improved techniques and servicing, the company said, Canada also was believed to be in a prominent position as a producer of such other kindred products as radium and its by-products for use in medical and industrial research.—*The New York Times.*

GREAT BRITAIN

Underwater Photography

Successful underwater photography has obvious advantages for providing data regarding submerged wrecks and below-the-waterline damage to ships. The British Admiralty has developed a new technique in its use. Naval frogmen, working 80 to 100 feet beneath the Mediterranean by





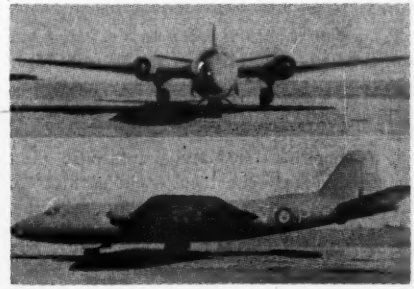
Above, underwater photo of the gundeck of a submarine in motion; below, a torpedo leaving a submerged submarine.

daylight and by floodlight have been carrying out important trials with their cameras.

This new photographic method may play an important role in modern warfare, especially in the examination of the underwater defenses guarding an enemy shore.—*The Sphere*, Great Britain.

Jet Bomber

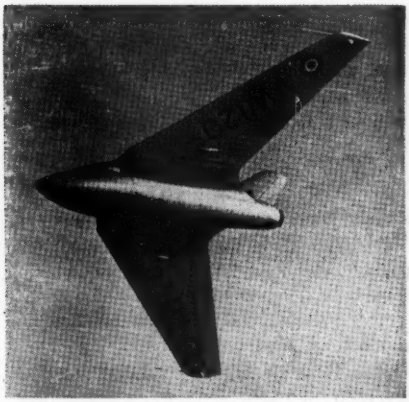
Britain's first jet-propelled bomber made its initial test flight recently. This bomber is propelled by twin jet engines at a top speed of approximately 600 miles an



hour—virtually twice the speed of present RAF bombers—and has a range of 3,000 miles.—*The New York Times.*

Faster Than Sound

This is the de Havilland *D.H. 108* jet-propelled research airplane which is reported to have flown at a speed greater than the speed of sound.



The flight was part of a research program in which the *D.H. 108* has been flown at increasingly high Mach numbers.—*The Royal Air Force Quarterly.*

USSR

Industrial Arsenal

The sprawling expanse of Siberia is undergoing so intensive an industrial build-up that by 1950 Russia will be as much a power in Asia as in Europe from the viewpoint of basic industries.

The *Far Eastern Economic Review*, in an analysis of the current 5-year plan (1946-1950), found production running slightly ahead of schedule. By the end of that period, 47.5 percent of all coal is to come from the Urals and points east, plus more than half the total steel output. A 1,200-mile section of the Trans-Siberian Railway is being electrified to expedite transport and will be the world's longest electric railroad.

Completion is expected of the huge Novo-Tagil steel works and the Cheliabinsk works, as well as substantial progress in four other plants in the Urals and Siberia. Attention is being directed toward expanding the production of thin cold-rolled sheet steel, of which the Cheliabinsk plant will be the principal producer in the USSR.

Siberia proper will provide coal, gold, and other metals; wheat, automobiles, tractors, harvester combines, locomotives, textiles, and leather. In the Kuzbass coal region, resources of iron ore, manganese, zinc, and bauxite are being developed.—*The New York Times.*

Armed Forces

Russia has more than 5,000,000 men under arms and is constantly increasing her military strength, the US Senate Foreign Relations and Armed Services committees reported recently.

The Russian military budget for 1949 has been increased by 19 percent over 1948; there has been progress in the training of troops—the ground forces are estimated to be in better condition than any time since the war.—*The New York Times.*

Steel Process

Soviet Russia is reported to be spending 2 billion dollars, the estimated cost of the American development work on the atomic bomb, on a new method of making steel.

Dr. Gerald Oster, physical chemist at the University of London, says that the huge sum is being spent by the Soviet government on steel plants in the Dombas and Soviet Asia. The process, which uses pure oxygen or oxygen-enriched air in the blast used to make steel, is being used more or less widely in the United States.

USSR development of the use of oxygen in steel making is based on the work of Russia's best known atomic scientist, the English-educated Dr. Peter Kapitza. Dr. Kapitza has developed a turbine for producing large quantities of pure oxygen more quickly and cheaply than previous methods.

In the new oxygen process, the cost of making steel is said to be reduced 25 to 30 percent.

Another important industrial use of oxygen in the Soviet, Dr. Oster states, is in work on burning coal underground to produce gas. Proposed by the Russian chemist, Mendeleev, in 1888, underground gasification of coal was first experimented with by the Soviets in 1931. American scientists also are working on this.—*Science News Letter.*

Transport Aircraft

Reports say that Russian transport aircraft production is now over 100 per month (equivalent American figure is 17 per month). The close relationship of civil and military transport systems means that all aircraft of Russia's hundreds of airlines—headed by Aeroflot—are always available for instant military use.—*The Royal Air Force Quarterly*, Great Britain.

Modern Warfare and Economy of Force

Translated and digested by the MILITARY REVIEW from an article by General Gerardot in "Revue de Défense Nationale" (France) February 1949.

IT IS commonly said today that war, even when it terminates in victory, does not pay. Can this be entirely true?

Could it be said that war was unprofitable for Rome, or for England in more recent times? Could it be said that it was unprofitable for the United States in World War I or World War II? Is not such a statement the result of considering only a few typical cases, such as France's overly costly victory in 1918, which led to her defeat in 1940, or Germany's incomplete defeat in 1918, which permitted the victory of 1940?

War is indeed unprofitable unless victory costs the conqueror little and the conquered dearly. If victory has exhausted the conqueror as much as the conquered, the balance of forces may be rapidly reestablished. This balance may even be reversed if the conqueror becomes lax with respect to his own power and deluded with regard to the completeness of the defeat of his enemy.

On the Western Front during World War I, the Anglo-French-Belgian losses were greater than those of the Germans when the latter were on the defensive. In 1941-1945, on the Eastern Front, the Russians were the conquerors, but they lost 7½ million soldiers while the Germans probably lost no more than 2 million.

Under these conditions, especially in countries such as France where the population and birth rate are small, victory appears to be of little value in ground warfare. There is a momentary gain, but in the final analysis there is a loss. During the interval between the two World Wars, France was dragged down by the ball and chain of victory. She was defeated in 1940 because the price paid for victory in 1918 was too high. This is a policy which France cannot afford to follow again.

British-American Policy

Are other policies possible? Two countries have conducted their wars economically. In World War II, England lost 306,000 men and America 275,000. At the same time, America inflicted losses six to eight times as great on her enemies.

These results were achieved because both the English and the Americans understood better than other nations that wars and battles must be prepared psychologically and fought with the best weapons obtainable.

World War I, which ended in an incom-

plete victory, cost England 810,000 dead. World War II, which was a longer and much harder war waged against Germany, Japan, and Italy, cost her only 306,000, plus 542,000 lost by the British Commonwealth nations.

The relatively lighter losses of World War II were due to the fact that England was able to wait until the armaments necessary for victory were ready and until the morale of the enemy was sufficiently shaken.

The most typical example of an economically conducted war is that waged by the United States. Its enemies suffered losses nearly eight times as great as those inflicted on the United States. This was due, principally, to the fact that the Americans were able to wage a technical war with means which permitted them to keep human losses to a minimum. The American command admitted that occupation was the final condition required for the defeat of the enemy, but they prepared this occupation in such a manner that it would cost as little as possible.

The following is what General Eisenhower counsels his government and his fellow countrymen in his report of February 1948: "The Army supports the theory that air power occupies a dominant position in modern warfare and that, with proper ground and sea support, it may batter an enemy into readiness to quit a war. The Army also recognizes the necessity of maintaining such naval power that can dominate all sea approaches to this continent and control sea lanes required for the prosecution of a war. But basic to any plan for our own defense and for the employment of air or sea power against an enemy, is the crowding forward of land bases, seized and occupied by powerful ground forces."

Further on in his report, General Eisenhower says: "There can be no question that, should war be joined with great forces on this continent or any other, a decision must be reached by the striking power of the Army. However, America, with its industrial power and technical resources, should avoid this type of warfare; such a conflict can bleed a nation white and yet result in nothing but stalemate."

If we desire to conduct a war economically, it is necessary:

1. Not to enter the war until the morale of the adversary has been weakened and that of one's own people and forces has been strengthened.

2. Not to wage decisive battles, if possible, until the morale and the physical resistance of the hostile forces have been weakened, meanwhile having maintained the morale and strength of one's own forces.

3. To have provided one's self in the prewar period with technical equipment superior from the standpoint of quantity and quality to that of the enemy, and to force the latter to fight a type of war that is most favorable to our own purposes.

Psychological Warfare

The first of these three principles includes psychological warfare, which is to be carried on even in time of peace. As it would require too much space to treat psychological warfare here, I shall simply call attention to what Lenin said about it:

"In 50 years time, there will be no great reason for the existence of armies. We shall have undermined our enemies sufficiently before hostilities begin, so that the military organization which they possess will be incapable of being used in the hour of need."

Psychological warfare is the prelude to military warfare. The conduct of psychological warfare, as well as its outcome, is not dependent on military chiefs, but on political leaders and a national defense staff.

While psychological warfare should be stepped up still more with the beginning

of hostilities, the second principle requires that the military command attach great weight to the health and morale of the troops.

In the past, roughness, blind discipline, and even brutality seemed to be the best formula for creating dependable troops whose morale was at least solid, if not high. Now, the medical service and psychological science maintain the strength of units and the morale of troops.

The remarkable decrease in the percentage of deaths due to war wounds, according to General Marshall, is one of the most direct and striking testimonies to the immense amount of work that has been accomplished by the military medical service. A comparison of the death rates by sickness in World War II and other American wars is impressive. During the Mexican War, 10 percent of the officers and men died of sickness each year. The rate was reduced to 7.2 percent among the Union troops during the Civil War, to 1.6 percent during the war with Spain, to 1.3 percent during World War I, and to 0.6 percent during World War II.

The morale of the troops was also an object of constant concern to the American command.

The conditions under which American soldiers lived during the war, their exposure to danger, monotony, and the complete absence of comforts to which their fellow countrymen are accustomed, weighed heavily on their mental and nervous state. From the beginning, the Army recognized that this nervous tension should be counterbalanced by healthy diversions.

Special Services was organized to distribute books and newspapers, organize shows and radio broadcasts, distribute sports equipment, and arrange sports competitions. This Service has at its disposal neither a "people's commissar" nor an army morale officer to keep it informed about the morale of the troops. Rather, it has the advantages of an opinion research organization. The demobilization point system was based on studies made to determine the opinion of the soldiers.

Morale is also influenced by food, and this important matter was not left to the initiative of subordinates.

Without question, the United States Army was better fed than any other army in history. The advances made in the field of war rations by this Army are almost revolutionary. The "C" and "K" rations of the troops in combat were of a variety the soldier would not have dared dream of a few years ago.

Lastly, good armament is necessary for front-line combatants, for the enemy constantly strives to destroy the confidence of an opponent in his weapons and his high command.

When faced with an intelligent command which studies and puts into effect measures which will raise the morale of the personnel of its army, the adversary usually attempts to thwart the measures that have been taken or which are contemplated. The command will continue its peacetime propaganda by radio and films. The more a peacetime civilian has been won over, the easier it will be to reach the civilian-soldier in time of war. The effects of this action on morale will multiply spontaneously. Techniques must be established, and it must be acknowledged that the Russians are far in advance of the Americans or the Western Europeans in this sort of warfare.

The French command should therefore create a real psychological service. This service should keep itself informed on the morale of its own armed forces, and also study all the modern means of improving itself.

It is not enough to try to build up the morale of one's own forces and to undermine the morale of the adversary before the battle. The morale of an enemy must

be undermined during a battle, in order that the battle may be won at minimum cost. This was easier in times past, which partly explains why the battle cost the conqueror so little. But old methods have little effect now.

The arrival of the enemy in the rear of an army once was the decisive event of a battle, but it no longer produces the same terrifying effect on the combatant. As a matter of fact, the combatant no longer sees the enveloping movements which now are executed on a scale previously unknown. Only the high command is in danger of being frightened and of losing its head. Only indirectly will the combatant even notice an envelopment, because of the narrow limitations of local combat operations.

Measures taken against morale assume many forms. In one case, it may be a new technical action which surprises the enemy and throws him into a panic because of his lack of defense against it. An enemy is dealt blows without being able to react, such as the employment of tanks in 1916 or the dive-bomber attacks of 1940. In other cases, the measures may be mass action by tanks, powerful fire action, disorderly withdrawals of adjoining units, successive defeats, or heavy losses. The effects may often be on morale alone. The noise of *Stuka* planes as they dived played a large part in the terror which they inspired. The consequences of these measures, however, are much greater in the case of forces which are poorly officered and undisciplined than on a force of professional soldiers accustomed to combat. At the beginning of a war, troops which have been mobilized only recently have always found it difficult to stand fast. This was proved in 1914 and 1940.

Action against enemy morale is therefore much harder to make effective today than formerly. It is not even possible, now, to defeat the enemy in a single action. His defeat is carried out along the whole front, which explains the duration of modern battles. Hence, to be the victor in this clash of morale, much more powerful means are required than formerly. This clash must be extended over considerable time and space, the same as the battle itself. Otherwise, victory can be obtained only by hard and bloody combat, as in World War I.

Only by using psychological war in peacetime can a nation conquer cheaply. Hitler understood this principle and began his psychological war in 1933. The Cominform began it long ago, applying the principles laid down by Lenin.

After Hostilities Begin

Once hostilities have begun, propaganda must continue. Thus, the soldier who arrives at the battlefront without convictions, faith, or courage, is already half beaten. He will be able to do nothing if he finds himself faced by fanatical, confident men. Victory, in such case, will be won by the adversary at small cost. Psychological warfare begun in time will have been profitable. War may become as profitable as it was to Hitler in the fall of France in 1940. Hitler's advantage would have continued for an extended period if he had been able to stop at that time.

Weapons have always played an important role in war. In ancient times, the Gauls began to be defeated by the Romans the day the latter learned to make good swords and shields from better metal. Today, as then, an army's morale cannot hold up in the face of lack of equipment. Lack of equipment can be compensated for only by the greatest heroism on the part of the troops, which means a greater sacrifice of men.

Today, the life and future of a nation, especially in the case of France, depends on economy of manpower. For this reason, a nation's high command cannot

neglect any aspects of armament in modern warfare.

Under these circumstances, the art of command is to replace men by equipment to the maximum extent and to expose the equipment as little as possible to the hazards of war. The best weapon is that which permits endangering the lives of the least number of men in the attainment of a given objective.

At present, aviation makes the greatest use of the machine for the attainment of maximum effect, economizes on men to the greatest extent, and offers maximum efficiency. This is especially true since the discovery of the atomic bomb.

The importance of aviation was demonstrated in the Battle of Britain in 1940, and Churchill was able to say: "Never in the field of human conflict was so much owed by so many to so few."

Today, to an even greater extent because of the atomic bomb, aviation is able to inflict the heaviest losses on the enemy with the least risks. Of the three armed forces, the air force best applies the principle of economy of force, particularly of manpower.

The English and Americans have been aware of this for a long time, even before the employment of the atomic bomb. They seek to avoid ground warfare when matériel is scarce. Regarding ground operations, General Eisenhower wrote in his report of February 1948 that "such a conflict can bleed a nation white and yet result in nothing but stalemate."

The Allies have other reasons for fighting in the air rather than on the ground. They believe it is sensible to force an adversary to fight in the domain in which he appears to be the weakest and in which they are the strongest.

Future Warfare

In the future, France's greatest advantage will be in the air. Also, by stressing aerial warfare, France will be able to keep enemy planes from spreading death and destruction over her national territory. This will mean a still further saving of the nation's human potential.

Finally, only by the support of a strong air force will our ground army—weakened by fifth columns, divided politically, and mobilized at the last moment—be able to resist a fanatical enemy imbued with communistic propaganda. Without air support, the French Army would be less able than in 1914 and 1940 to resist a ground offensive.

The war of tomorrow will be based no longer on the foot soldier and ground forces, but rather on maximum mechanization and air power.

The war of tomorrow may require only a minimum of well-equipped ground forces, but a prime requisite will be a large air force.

It will be necessary, therefore, that a victory in the air precede all action on the surface. Allied air forces must be able to attack enemy troops with such force that the enemy will be weakened. Our own ground forces, supported by organized fortified zones, then will be able to resist.

Such air action requires air superiority from the beginning of hostilities. This superiority is indispensable if we are to avoid standing by helplessly while our national territory is devastated by enemy air action.

Air action will protect our cities and our population at a relatively low cost by destroying the enemy air force. It will then aid our ground forces, which will never be very strong at the beginning of a war. This mission should not be given entirely to an Allied air force, since we do not know whether help would be able to arrive in time.

We should not rely on our Allies for air defense, nor should we sacrifice the French population, which has already been bled white, to lighten the burdens of war for our Allies by taking upon ourselves the

burdens of ground warfare. Ground warfare is the most costly from the standpoint of human lives.

France must create a powerful air industry. The life of France and her independence depend, in the main, on the existence of this powerful French air industry. However, this industry must be established in North Africa.

Everything indicates that our efforts should be made in the air. We must have our own planes and our own pilots. Our country must have the will to conquer, and it must win with a minimum of human losses. It is not only possible for our country to prepare a defense of this type, but it is the only real answer to those who base their expectations on "paper" divisions. Our life and our future will depend on the adoption of this modern solution to our problem of national defense.

Only by psychological warfare, judiciously conducted, and by development of her own air forces, will France be able to avoid again the slaughter of 1914-1918 and the defeat of 1940.

Psychological Warfare

Translated and digested by the MILITARY REVIEW from an article by Commander S. Haraldsen in "Militaer Orientering" (Norway) No. 10, 1949.

PSYCHOLOGICAL warfare, or propaganda employed in international conflicts, is as old as history itself, though each successive war has improved its technique. Psychological warfare is only partly military, but the great role it played during World War II makes it necessary that military personnel give this side of modern warfare the greatest attention.

Arguments will be heard from many quarters to the effect that Norway, with her limited resources of personnel and matériel, has no chance to offer anything in this direction. But experience has shown that none of the factors which enter into the conduct of modern war and which require so great an employment of indirect forces can be ignored without suffering an inevitable penalty.

Psychological warfare may appear to be an alien concept in Norway's defense, but we have used it in the past and we must use it again.

Propaganda

When propaganda is employed in international conflicts as a means of attaining political aims, it is commonly designated as psychological warfare. There will certainly be a difference of opinion with regard to how far one may go in time of peace in the use of so strong an expression as psychological warfare. But the intensity of the so-called "cold war" and the lessons of the last war strongly support the idea that the warfare of the present day must be called psychological warfare.

The word propaganda was given a one-sided meaning in the period between the two World Wars. We were little aware of the fact that propaganda was identical with that which we encountered every day in the form of advertising.

The Americans state in their postwar reports that they were little acquainted with propaganda when World War II began.

Norway was in approximately the same situation before 1940. We knew little of the nature and use of propaganda. We have since learned that war with words is a part of total war. It is not conducted only when weapons are being used. It may begin long before hostilities, continue during armed conflict, and be extended after the cessation of hostilities for the purpose of attempting to change defeat to victory

or to reduce the consequences of defeat. Like mustard gas, which clings persistently to the ground, psychological warfare is also able to persist, spreading the poison of hate and distrust.

The best defense against a weapon is complete knowledge of what it is, how it functions, what its purposes are, and how and where it can be used.

Historical Examples

Psychological warfare is not a German invention. All the Germans did in the last war was to improve its technique. History records many instances where rumors of secret weapons and other measures of creating fear and panic won a battle before it began. Psychological warfare is a method of turning attention from one's self and activities and directing that attention toward a concentrated objective. For example, Emperor Nero was suspected of having set fire to Rome. Nero laid the blame on the Christians, who were convenient scape-goats at that time. The latter were tortured and executed in order that suspicion might be turned away from Nero himself.

Hitler did the same thing when he murdered 6 million Jews in Europe. Under cover of these murders, he was able to work unnoticed in other fields.

The war cry of ancient times was also a form of psychological warfare, but modern war has found other means of much greater effectiveness.

In World War I, the Allies originated and introduced psychological warfare. What success they had is shown by Marshal Hindenberg's desperate appeal to the German Army and civil population.

"The enemy is conducting his fight against us with various means. He bombards our front not only with artillery but also with printed paper, which also kills, along with his shells. His aviators drop leaflets on us in order to destroy our spirit. The enemy hopes that the soldiers will send home the leaflets which come sailing down so innocently from the sky. At home, they will pass from hand to hand and be discussed in restaurants, public places, and homes. Thousands, unwittingly, will swallow their poison."

Types of Psychological Warfare

No nation or man can boast of being immune to propaganda. We know from everyday experience that money spent on good advertising always pays. Mentally, we have always been receptive to propaganda. A large proportion of our intellectual diet is supplied by newspapers, periodicals, the radio, and movies. These are the means or weapons that can be used against us.

In time of war, we are subjected to military aggression in addition to that which we encounter in time of peace: namely, propaganda, economic warfare, and political aggression. The concept of "total war" is only a part of the concept of "permanent war." The ideologists of Germany and Japan laid the foundation of this idea. Aggressive nations work indirectly for victory in time of peace; but in time of war, all persons and things work directly for victory.

All psychological warfare, whether it is carried on in time of peace or in time of war, has the following general objectives:

1. To weaken and gradually destroy the enemy's morale and his will to resist.

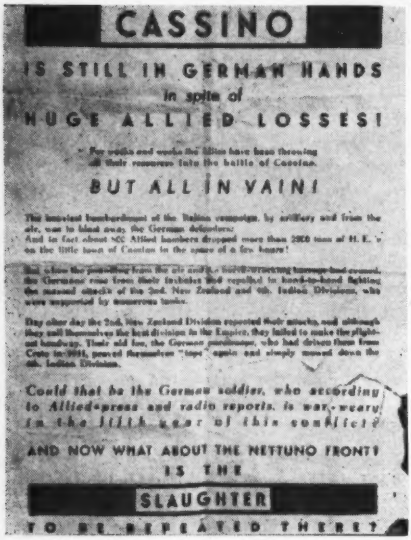
2. To stir up and strengthen the will to resist in areas occupied by the enemy.

3. To promote distrust of and hostility to the enemy government within its military forces, on its home front, and among neutrals.

4. To keep neutrals neutral, but to court their friendship and sympathy and, if possible, their active cooperation.

Propaganda used in psychological warfare may be divided into three parts:

1. Strategic propaganda, which is directed against the population in the


CASSINO

IS STILL IN GERMAN HANDS

in spite of

HUGE ALLIED LOSSES!

BUT ALL IN VAIN!

Could that be the German soldier, who according to Allied press and radio reports, is war-weary in the fifth year of this conflict?

AND NOW WHAT ABOUT THE NETTUNO FRONT?

IS THE

SLAUGHTER

TO BE REPEATED THERE?

German propaganda sheet fired into the Anzio beachhead, Italy.

enemy's country, mainly by means of radio, leaflets dropped from aircraft, or the spreading of rumors.

2. Tactical propaganda, which is directed mainly against the enemy's military forces, most frequently by means of leaflets in a special type of artillery shell or released from planes. Leaflets disseminated over the front are further supplemented by mobile broadcasting stations.

3. Occupational propaganda, which is employed in territory won from the enemy. The means employed here are the newspaper, the moving picture, periodicals, and exhibitions. The object of this propaganda is to promote a new viewpoint, after the population has been exposed to the poison of the enemy's propaganda.

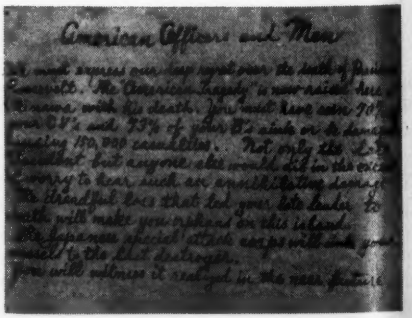
France, The Victim of Words

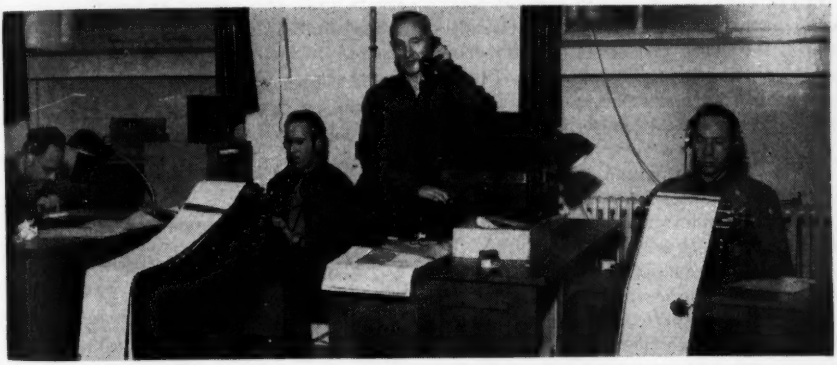
One morning in Paris in 1940, Parisians on their way to work found the streets strewn with freshly fallen leaves. But these leaves were not ordinary ones.

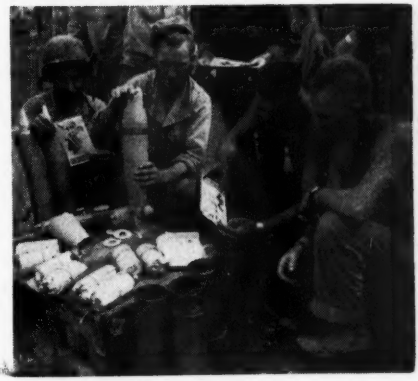
During the night, while the Parisians slept, feeling secure in the belief that the Maginot Line was impenetrable, German planes had dropped their loads of green leaves over the city. These leaves were a perfect paper replica of natural green leaves. They bore the following words: "If you fight England's fight, your soldiers will fall like autumn leaves." The Parisians were shocked. All during the winter, they had been exposed to propaganda while the front was quiet. The French forces sat in the Maginot Line and the Germans back of the Siegfried Line. The situation had undermined the nerves of the French population.

During these months of military inactivity, the French had been fed the poison manufactured by Goebbels under various forms and camouflages. French Nazis spread defeatism with remarks such as: "What's the use!"; "The English will fight to the last Frenchman." These phrases were repeated thousands of times and, as Hitler himself said: "The greater the lie and the oftener it is repeated, the more it is believed."

Japanese leaflet found on Okinawa, 10 days after President Roosevelt's death.


American Officers and Men





The radio, the written word, and pictures are among the more important weapons of psychological warfare. Above, Radio Luxembourg was used by the US 12th Army Group to monitor radio broadcasts and then to rebroadcast the news for psychological warfare purposes. Right, men of the 361st Field Artillery Battalion on Leyte in December 1944, load propaganda leaflets into artillery shells to be fired over the Japanese lines. Below, preparing to fire the propaganda-loaded shells on Leyte; the officer on the right was Psychological Warfare Officer of the US Eighth Army.—US Army photos.

What the French people did not know before it was too late was that Goebbels and Hitler were not interested in beginning a military campaign until the French had been sufficiently softened. When the military campaign finally began, victory over France was won so quickly that the German High Command was unprepared to carry out its invasion of England. Germany's undermining of France had been thorough. It was brought about by the buying of newspapers, bribery, and the spreading of rumors. For example, the expression, "Where are the English forces?", was whispered about continuously. Persons who spread rumors saw to it that this question was repeated frequently, but with no answer being given. Then the answer came in the form of millions of leaflets dropped from the sky, showing the picture of a dirty French soldier in a weapon emplacement, while a French woman lay in the arms of a British soldier.

French soldiers who had spent tedious hours in the Maginot Line also were not overlooked by German propaganda. They were daily entertained by loud-speakers in the Siegfried Line. They listened to concerts of popular French melodies. French soldiers were invited to come out of the Maginot Line and wash their clothes in safety. After the invitation had been repeated a number of times, the German efforts were rewarded by the sight of French soldiers accepting the invitation.

But the German loud-speakers continued: "Now you see, French soldiers, that we were not fooling. We invited you to wash your clothes in safety, and we kept our word. We like you. We desire no war with you. It is your leaders who have deceived you into fighting a war for England."

Many variations of this propaganda continued, against both the military and the civilians. In the German attack of May 1940, terror and fear were used to create panic and chaos. The civilian population was frightened out of the cities and blocked the roads for military traffic.

After the British evacuated Dunkirk, German propaganda began to magnify the catastrophe with the following:

"France stands alone and will bear all the sacrifices while England is safe and quite willing that the war be fought to the last Frenchman."

This was the German strategic concentration in the propagandistic war. It was well organized and exploited to the fullest extent and down to the last detail. Since World War I, they had learned how to make use of this weapon. But the story of the Allied effort will show that the Germans met their match.

Allied Propaganda

In spite of the superiority of the Allies in propaganda during World War I, they were wholly unprepared at the beginning of World War II. Their preparedness in this respect was on a par with their preparedness in other ways.

But the evacuation of Dunkirk set in motion the British propaganda machinery. By the aid of propaganda, this catastrophe was changed into a great achievement.

As the last troops left the beach at Dunkirk, British aviation began to bombard the Germans and the French with leaflets, and the British Broadcasting Corporation (BBC) talked to the civilian populations and told the Germans: "We are coming again, and will free you from the Nazi yoke." From the BBC, General de Gaulle continued to call all Frenchmen to resist until sufficient forces could be assembled by England and her allies. This helped to build up the French resistance movement which presented powerful opposition to the Germans during the remainder of the war.

The stream of catch phrases which flowed from the BBC built up Allied

morale, created difficulties for the Germans, and gave hope in occupied lands.

In December 1941, when the United States entered the war, Allied propaganda received powerful aid from United States Office of War Information (OWI) with its overseas sections.

The OWI organized a broadcasting network for short-wave broadcasts overseas. In 1 year, 26 short-wave transmitters, which presented "The Voice of America" in 25 languages and dialects, had been installed. The American propaganda machine's first great achievement was: "Remember Pearl Harbor."

In the final phase of the war and during preparations for the Allied landing in France, the Psychological Warfare Branch got under way. This grew to be an organization of 4,600 persons, and was of great significance in connection with the landing in North Africa and Normandy and during the fighting on the Continent. The American Army's newspaper, *Stars and Stripes*, printed such effective thoughts as: "Words are cheaper than blood, but both help to win the war." The tactical worth of this concept was proved in the surrender of 100,000 Germans and Italians.

The Axis Powers' weakest partner, Italy, was given special attention. It was subjected to such propaganda that the Germans themselves were forced to take over in Italy and keep watch over their weak partner's morale. "Allied safe conduct passes" were strewn by airplane over the areas that were being worked on. These passes, designed as a formal document with General Eisenhower's own signature, were accorded a good reception and were sold on the black market. (It was best to obtain possession of one while one had the chance!)

Some of the other Allied leaflets during the final phase of the war treated these subjects:

The Western Front.

Breakthrough of the West Wall.

More Than 100,000 Prisoners Since Invasion Day.

Anglo-American Air Offensive From the Rhine to the Eastern Front.

The Eastern Front.

East Prussia, Wartheland, and Silesia Conquered.

Eastern Germany's Ruhr District Seized.

The Red Army Now Far in the Interior of Brandenberg, Saxony, and Pomerania.

These leaflets were strewn by the hundreds of thousands over German areas.

Marshal Ludendorf wrote in a document which was found after the armistice of 1918: "There are times and situations where well-worded and rightly placed propaganda is able to do more than a hundred tons of high explosive." It is certain that Ludendorf's theory was put into practice by the Allies, and it gave just such results.

Prophecy of war is not based solely on appreciation of current events, examination of international forces, or geographical conditions. The thing that really determines war is human nature itself.

General Lopez Valencia, Spain

Reflections on Operational Command

Digested by the MILITARY REVIEW from an article by Major General C. Vokes in the "Canadian Army Journal" (Canada) January 1949.

ANY officer who aspires to command in war can learn and profit from those who have had battle experience. To exercise command in battle, you must know well the personal characteristics and temperament of your subordinate commanders. No two men are exactly similar and their reactions to any particular set of circumstances will never be exactly alike. They may be aggressive or cautious; quick off the mark or slow. They may be stubborn in their views and argumentative or the opposite. They may be self-reliant or slow to assume responsibility.

It is your task as a commander to inspire their confidence and get the best out of them. You must have confidence in them. If there is a clash of personalities or a lack of mutual confidence, then you must get a new subordinate. As a commander, you and you alone must sit in the driver's seat as far as your subordinates are concerned. An operational command is an intensely personal matter and a lonely one for the commander.

As a commander, you must never lose the personal touch. You must see and be seen. Deliver your orders in person and verbally — never written — and never through a staff officer. You cannot control a battle from amongst the most forward troops, as your perspective there is too narrow for the modern battlefield, but you should be seen everywhere. If you can cultivate some idiosyncrasy which stands out, do so. It helps to draw attention, and you can be recognized easily by your troops.

To exercise command properly, your tactical thought must be oriented two commands below your own. That is to say, if you are a divisional commander, you must think in terms of regiments and/or battalions; if a brigade commander, in terms of squadrons and/or companies. Your orders should, in all cases, reflect this thinking. It helps you in control and perspective.

To give yourself proper scope for command in person, your operational headquarters must always be located so that the forward portions of your command are easily and quickly accessible. It is difficult to lay down a rule of thumb for locating headquarters, as ground, cover, roads, and tracks all have a bearing. I think the following are reasonable limits in battle operations of an intense nature, but where operations are fluid over a large area, they are difficult to apply:

1. Battalion headquarters, 5 minutes on foot from forward companies.

2. Brigade headquarters, 5 minutes by jeep (or equivalent) from headquarters of forward battalions—night travel without lights.

3. Division headquarters, 5 minutes by jeep (or equivalent) from brigade headquarters—night travel without lights.

To accomplish the above positioning requires that your "main" or operational headquarters be as compact and mobile as possible. I am not a believer in "tactical" headquarters or "command posts" where a commander isolates himself with a couple of junior staff officers and whatever communications he deems necessary. Your main headquarters is the operational center of the organization. That is where you live, sleep, and eat and from which you go forth on your daily rounds, accompanied by one other officer who listens on the radio—when it works—and a driver. But you must be within easy reach of your main headquarters at all times.

I mentioned above that your operational headquarters had be be as compact and

mobile as possible. This means constant pruning is necessary. It is amazing the number of characters and vehicles who tie themselves on from time to time. Some, but not all, are essential. Everything redundant to combat control must be included in your "rear" or administrative headquarters. This part of headquarters does not need to be as far forward, since it copes with routine administrative duties and administrative installations located in the rear. Of course, your chief administrative adviser must live at "main" headquarters, as you must be in constant touch with this side of the picture. He alone is sufficient, however. His assistants and the heads of the administrative services are at the rear headquarters.

I would like to emphasize that nothing irritates a subordinate more than to be called back to your headquarters when his troops are engaged in combat. You must always go to him. On one occasion which stands out in my memory, I was ordered back to corps headquarters to explain my plan for an attack which was to be mounted 2 days later. At the time, I had two brigades engaged in combat and, although the situation was not critical, my presence was needed at my own headquarters. I was 4 hours getting to corps headquarters over traffic-congested roads, and over 4 hours getting back. There was no need to put me to this inconvenience. My corps commander should have come to me or else placed his headquarters in a more accessible place.

In conclusion, I will again repeat that any officer who aspires to command in war can learn and profit from those who have had battle experience. This experience was gained the hard way, and those who profit will save themselves much blood, sweat, and tears, if the time should ever come again when we face an enemy in combat. Needless mistakes are costly, especially where one can learn beforehand from the experience of others.

The Background of Soviet Strength

Digested by the MILITARY REVIEW from an article by Captain D. N. P. Brunicardi in "The Irish Defence Journal" (Ireland) July 1949.

AN ASPECT which is somewhat neglected in studies of the Russian armed forces is the effect racial characteristics have on the structure and employment of those forces. The following observations, then, may be found suggestive and possibly illuminating in the study of the biggest land army in the world.

Cannon Fodder

First, the number and fertility of the peoples of the Soviet Union is so great. In Russian military history, human beings have always been "expendable." Efficiency is at a discount, at least when directed to economy of human lives. Operations staffs are prepared to envisage appalling losses to achieve their strategic aims; witness the defense of Stalingrad. It was this "generosity" with the lives of their soldiers that enabled the High Command to defeat eventually the German forces, and to win the war notwithstanding the loss of some 10 million soldiers and civilians of a total population of 180 millions.

Note on the Russian population: in the 50 years from 1897 to 1947, the population rose by 87 millions—from 106 million to 193 million. The relation of rural to urban population is about 2 to 1.

The Russian attitude toward human life is reflected in the crudeness of the medical arrangements in the forces as compared with the arrangements for the salvage,

repair, and reemployment of damaged and captured weapons. It is also shown in the reduced ration scale for hospital casualties as compared with front-line troops. In the West, the sick get more food than the hale. On the other hand, a noted characteristic of the individual Russian is his unselfishness in being willing to share his last morsel of food with his fellows.

A second characteristic of importance in war is the often-remarked toughness and endurance of all. This again has always been exploited. The accustomed low standard of living has simplified the supply problem for the Russian Commissariat almost as much as it did in the case of the Japanese. It is seen, too, in the ability of the soldier to live off the country. The Russian soldier is accustomed to frugality and very few amenities.

Again, the life of the Russian over the greater part of the territory accustoms him to combat, to extreme cold, and to temperatures impossible for Western forces. This superiority also has often been exploited in the timing of offensives.

Third, a primitive peasant population can be trusted to make good use of ground and cover, no matter how sparse. Consequently, we find that fieldcraft, camouflage, and patrolling are of a high standard. In patrolling, risks are undertaken that would not be contemplated by Western forces to obtain information about the enemy. This is significant in view of the lack of signal communication equipment.

Not All Russians

Fourth, there is the considerable proportion of non-Russians in the Soviet forces. These include large numbers of the various Turkic peoples of Central Asia, all Mohammedans, the various nationalities of the Caucasus, and Mongolians, Finns, and the Tungus of East Siberia. This diversity of races, as well as adding to the difficulty of encouraging initiative of the soldier or junior commander, introduces a militarily irrelevant factor of internal propaganda into organization. People who are not Russians, who have no Russian tradition, and who even have suffered in the past from Russian domination, must be made to fight for Russia. Recognition of this aspect of the racial problem has led to one of the admirable features of the Soviet social structure—its uncompromising official attitude against race prejudice.

Nevertheless, the problem remains, and if, as in the last war, appeals to Soviet greatness and the "glory of Communism" are found to be an insufficient incentive, and patriotism has to be resorted to as a source of morale, then any patriotic propaganda will have to include and emphasize the glory of purely Russian military achievement. This means working back from the defenders of Stalingrad to Peter the Great and Ivan the Terrible. No amount of advertising the Kazakh defenders of Moscow, or possibly the heroic sacrifice of the Uzbeks on the Normandy beaches, is going to obscure the invidious comparison between the master race and its subject cannon fodder.

Racial Minorities

Indeed, the emphasis on patriotism and race, and the Russian reference to World War II as the "Fatherland War," valuable though it was for the defense of Moscow and subsequently, had the effect foreseen by the founders of Bolshevism. It weakened the collective spirit of communism and the collective structure of the Soviet state. This, if continued, would have led, as it did under the Tsar, to racial discrimination by people of the Great Russian race against minority peoples. In fact, this happened in the Moscow panic of 1941, against the Jews. Postwar policy must, therefore, have reverted to catering for racial minorities, and, in fact, the Central Asiatic Mohammedan peoples are specially favored in this regard. Even

now, racial discrimination is not entirely foresworn and is evident in the case of peoples too small to be a menace. Hector McNeil in the United Nations Assembly referred to Russian "minorities who had completely disappeared from the territories they occupied. These include the Imgushi, the Krim Tartars, the Caspian Kalmucks and others who, by order of the Kremlin in 1946, had been deported en masse because some of them had collaborated with the Germans." To these, we may add the ancient German colony on the Volga which was removed in 1941, and the Baltic peoples, particularly the Catholic Lithuanians, whom the Soviets can never hope to "reconcile." The Russians cannot count on "unreliable" people such as these in a future war, at any rate not on the basis of patriotic appeal. Even with the Ukrainians, the Kremlin must proceed cautiously, as they are such a big section of the European Russians. Stories still persist of unrest in the Ukraine, and Mr. Maniulsky's Moscow-bestowed importance in the UNO may be taken as continued evidence of the Kremlin's desire to placate his people. When Maniulsky is heard of no more, the Ukraine will have been pacified.

On the reoccupation of the Ukrainian Province, entire regiments of Ukrainians in German uniforms were encountered. Normally, they would have been banished to Siberia by the Russians, but the immensity of the Province probably prevented this punitive treatment. It is likely, also, that the "Russians" captured in German uniform by the US forces in Normandy in 1944 escaped similar punishment for the self-same reason.

A fifth factor is the effect of geography on the people themselves. The great plain which is Russia, and its exacting climate characterized by snow, mud, and heat, have dominated and conditioned the lives of the people for countless generations. This has created an amazing homogeneity of population, together with a profound community of thought and feeling.

Illiteracy

Sixth, one of the drawbacks of this primitiveness, however, is the paramount necessity of extreme rigidity in planning and operations, of operation orders and combat orders, while allowing fluidity and changeability of the order of battle. Initiative is not a factor on which the Russian planner can count.

In his time, Trotsky realized that "It is true that the Tsar's army was constructed and armed upon Western models, but this was more form than essence. There was no correspondence between the cultural level of the peasant soldier and modern military techniques." The controlling, but by no means the only factor in this respect, is the appalling degree of illiteracy. Nothing expanded the soldier's mind and made him a thinking civilized being. Though the Red Army later waged a more effective struggle against illiteracy and ignorance, the basic problem still facing field commanders is that of control of an uneducated mass who have lived a life of blind obedience to rigid orders. This includes officers as well as men. The rigid orders and the blind obedience must therefore continue on the battlefield.

It remains to be seen what effect the modern system of educating all Soviet citizens will have on raising the general level of intelligence, and how this in turn will affect the use of initiative in battle.

The Military Situation in Europe

Digested by the MILITARY REVIEW from an article by Colonel E. H. Wyndham in "The Army Quarterly" (Great Britain) July 1949.

THE present generation has witnessed what is certainly one of the most singular series of events in human history. We have seen a great country, after being widely regarded with suspicion and mistrust on account of its ideology, forced by an aggressor into alliance in war with a group of nations to whom its political system was distasteful. We have seen this group of nations—through emotional influences overcoming their better judgment—completely abandon their suspicion and make far-reaching concessions to their new ally. We have heard some of our politicians affirm that the workers would with one accord put down their tools at the idea of a war against this great country. At the end of the war, its rulers had the ball at their feet and could kick it either into the goal of international goodwill, or into the field of international strife.

The above is a fair summary of the situation presented to the rulers of the USSR between 1939 and the end of 1945. They chose the latter of the above two alternatives and have succeeded within 3½ years in almost completely alienating sympathy. Within that space of time, they have:

1. Accomplished the almost incredible feat of destroying American isolationism.
2. Alienated the goodwill of the Conservative and Socialist Parties in Great Britain.
3. Brought about the Atlantic Pact.
4. Caused a Union of Western Powers, with consequent surrender of some degree of national sovereignty to be seriously considered.

Communist Policy

In any country in which the people were afforded the opportunity of acquainting themselves with the facts of the international situation and expressing an opinion based on these facts, it is certain that such a record of ineptitude would have meant the crashing fall of the statesmen responsible. It is true that Mr. Molotov has ceased to control foreign policy, but he has been succeeded by Mr. Vyshinsky, which would seem to make little difference. It certainly does not affect the basic principle upon which all communist policy must ever rest. This principle is that the capitalist system must inevitably fall, and that, therefore, all that good communists need do as regards foreign policy is to keep provoking dissension and disorder and to position themselves so as to be ready to take advantage of this event. If you believe that, of course you will not mind one way or the other such questions as American isolationism and that you are responsible for its demise. This will not strike you as indicating the failure of your policy, but rather as a sign of the straits to which the leading capitalist power is reduced in the face of impending doom. If we keep this article of communistic faith constantly in mind, we have no excuse for confused thinking. Obviously, no policy of appeasement has any chance of success. Nor shall we experience anything but humiliation if we allow our hearts to get the better of our heads with regard to the USSR as we did between 1941 and 1945.

Atlantic Pact

With this background of the Russian conception of foreign affairs in mind, we may turn to the Atlantic Pact, its most striking result. As we learned to our sorrow in the case of the League of Nations, a pact is of no value unless it is backed by properly organized power. This point has constantly been emphasized.

The Atlantic Pact is in effect an important development and extension of the Brussels Treaty. For example, the North Atlantic Council, established by Article 9, is to be served by a Defense Committee on exactly the same lines as the similar body which serves the signatories of the Treaty of Brussels. These two committees will surely need to work in very close harmony. Is it too much to hope that one day they may amalgamate? The objective of the Pact, as stated in Article 5, is to "restore and maintain the security of the North Atlantic area." Here a very important point must be stressed; each nation adhering to the Pact is, of course, at liberty to form its own idea as to how that security may best be assured.

As Mr. Acheson said when giving evidence before the United States Senate on 27 April, under Article 5 each country could "make an honest judgment as to what action would be necessary to attain the end of restoring and maintaining the security of the North Atlantic area, and consequently to take such action." Thus, the Pact does not commit anybody to an automatic declaration of war. Had this been the intention, it would of course have been constitutionally impossible for the United States to sign the Pact, since by the American Constitution war can only be declared by Congress. Nor, indeed, could any true democracy ever surrender the final responsibility for the fearful decision of whether or not to launch upon a war. In this respect, of course, "peoples' democracies" and all other forms of dictatorship are at an advantage. There is no need to consult "the people" in such matters. This, however, is a handicap under which we are well content to suffer. It is clear, however, that the element of uncertainty as to the action which individual nations may decide to take in hypothetical circumstances must hamper the deliberations of the Defense Committee.

The main point which we need to have constantly in view is that collective security can only be built upon a firm foundation of strength. This fact was ignored by the architects of the League of Nations, which lacked any such foundation. The United Nations has a paper foundation of strength, but the concrete has not been mixed nor the trench in which to lay it dug. In working, it has also been handicapped by the misuse of the veto. If power is to be built up collectively, the first step must be a military alliance based on full exchange of ideas, resources, and plans. The Treaty of Brussels was a first step in this direction, the Atlantic Pact, a second. Both treaties leave the door open for other nations to enter, and one may hope that gradually the foundation of power will spread and increase in strength. Only a clear demonstration of steady growth is likely to remove the hesitations of countries, like Sweden, which so far have been unable to make up their minds to enter.

The policy of the Soviet Union since the war has been to establish a system of collective power over as large an area as possible in preparation for the expected collapse of all capitalist countries. But the method has differed widely from the Western system of treaties voluntarily concluded. The Eastern method has been to enforce the communist ideology wherever possible. It is a point for consideration how much reliance as allies in war can be placed on countries thus bludgeoned into military alliance with a great power. Signs of dissatisfaction have already appeared in Yugoslavia, and it seems open to doubt whether the majority of the population of Czechoslovakia, Hungary, and Rumania, not to mention other satellite nations, is really at ease.

Conclusion

Lastly, we come to the question whether, in the interests of collective security, nations can be expected to sacrifice their

national sovereignty to some extent. Those in the Eastern collective system have been forced to do so, whether they like it or not. We seem to see Marshal Tito, at any rate, striving to recover his. In the Western world, if anything of the sort is to come, it must be a spontaneous movement. It is unlikely to take shape until it is quite clear that the foundation of strength through military alliances is well and truly laid. No one is likely to be prepared to sacrifice some measure of independence in pursuit of what may prove to be a will-o'-the-wisp. But it seems fair to suggest that it is illogical to proceed on our present lines, on the one hand talking of Western Union as an ultimate objective and, on the other hand, regarding with complacency the secession of members of the British Commonwealth, which is the only successful example of collective security which the world has ever seen.

The French Army—Its Past and Future

Translated and digested by the MILITARY REVIEW from an article by General Revers, Chief of the General Staff of the Armed Forces (War), in "Informations Militaires" (France) 10 January 1949.

TO COMMAND does not mean just to make decisions, give orders, and see to their execution. It also means knowing your men and making yourself known and understood.

Unfortunately, there is a point where human contacts become less frequent and are replaced by staff studies, organizational problems, and budget matters.

French Army leaders are aware of the personal difficulties encountered by the younger members of the Army. We admire the conscientiousness with which these young men attack the hard task to which they consecrated themselves when they made the Army their career.

Many of these young officers—often the best—have begun to doubt the wisdom of their choice. They have seen fellow officers suddenly abandon the Army after becoming discouraged and desperate at the present dismal conditions prevailing in the Army. They have become indignant at the destructive viciousness of part of the press toward the Army and all men who have chosen a military career. On the outside, we all encounter skepticism, and sometimes a humiliating attitude of pity. There is a struggle to make ends meet for our families. A difficult training task is encountered in our units. Under such conditions, little more is required to force some officers to leave the military service. The loss of these men further aggravates the qualitative and numerical problems of the Regular Army which, above all, is the foundation of our war machine.

In spite of these crippling conditions, we may still have hope. The present crisis duplicates very closely the conditions of 1921-1927 and later. Conditions are no worse now than they were at that time. Then, we saw technicians turn away from a military career, army classes deserted, and noncommissioned officer candidates disappear. An entire segment of the population normally qualified for higher military training turned down all opportunities to attend St. Cyr or the Naval Academy. For a long time, a violent campaign was waged against the military spirit and military matters in general.

Under the circumstances, the Army withdrew into itself. It was a difficult and uncertain period, during which a serious gap was formed between the Army and the nation. For this condition, the military was hardly responsible. Later, due to economic changes and threats from without, the movement was reversed and the

Army regained a part of its prestige.

Some persons will argue, now that times have changed, that the conditions of a future war seem more uncertain, that the role of ground forces is in doubt and that the Army may become only a supplementary service. This explains the differences of opinion regarding an army conceived along traditional lines. Out of these differences of opinion come all the difficulties we are experiencing with decreased appropriations and the future role of the Army.

All of these reflections are correct, but I find in them a new reason for confidence. The fact which ought to increase our professional faith today is that study and reconstruction have begun and are being conscientiously and wisely pursued.

The period which we are passing through at the present time represents only a brief moment in the evolution of France's national policy and military techniques. The crisis seems endless. A great deal of patience and clear vision will be required while it runs its course. After such a violent disturbance as World War II, it is only by systematic research and care in preserving our balance that those doctrines, without which there can be no serious reconstruction, can be worked out.

Research and Development

In the field of armament, our research and development organizations have already completed prototypes whose originality and value have been confirmed by foreign experts. French light armament, as a whole, has been perfected and revised. It will be furnished by French industries. The 12-ton tank is ready for production. A scout car has been completed, and numerous other products are ready for production the day our country shall require them.

The same situation exists as regards French air and naval construction. However, more difficult economic problems are involved in these fields.

As for developing fundamental doctrine, I do not believe that haste would be advantageous. Regulations and tables of organization gain nothing by being repeatedly revised. The latter, particularly, demand a sound basis of policy and technique. As we seek light on present day problems from the lessons of the past, let us keep in mind that the law establishing the nation's wartime organization was not written until 1938.

Doctrine can be developed only after exhaustive study. The lessons of World War II are only now being recorded. It is the task of the historical services and military schools to exploit these lessons and to test the principles brought out by them. Thus, the absence of regulations and instructions of a definite character is only natural. Of what use would it be to attempt to stop the march of time and to crystallize our teaching methods within a framework which is as yet unfinished? The important thing is that we should not delay the instruction of the men in our units just because all the principles that have been recognized have not been verified and stabilized into a system.

Unit commanders, in addition to their regular training programs, have the important responsibility of keeping their men alert and informed about progressive military thinking and important decisions. Commanders must be interested in results and unafraid of controversy.

In the absence of new regulations, which will not be finished for several years, unit commanders must use current military publications. The sole purpose of such publications is to disseminate the military thought of the day.

The reasoning which leads the average Frenchman to regard our present military system simply as a costly toy of little value is based on the belief in the overwhelming power of the self-propelled long-

range missile, carrying an atomic explosive. This belief, now quite common, is the favorite theme of the armchair tactician and the retired military man.

Even if we assume that the atomic age will result in a revision of old strategic concepts, the military leaders of the great powers have not decided that ground forces should be abolished.

It would seem, as a matter of fact, that the atomic bomb is almost exclusively a strategic weapon with little utility on the field of battle. It is true that Japan capitulated before the clash of ground forces on Japan proper, but it capitulated under the threat of this clash. For the greater part, Japan surrendered because her military forces had suffered irreparable losses on land and sea outside of Japan.

It would be ridiculous to assert that the general conduct of war is for the military alone. But it would be still more ridiculous to say that war is not to be dealt with by armies.

My object has not been to enunciate any academic theory. I have only suggested that truth is on the march. If, unfortunately, the perils which now threaten peace continue or are aggravated, our eyes will be opened gradually. A logical organization, now being developed by the government and our own research department, will be ready for adoption.

We are not the only nation in Europe or the world that is pondering these questions. Other nations are studying their archives and are running up against the same obstacles. We are not alone in facing new dangers.

Army Accomplishments

The French Army, with a budget that is being reduced each year despite the war in Indo China, succeeded in 1948 in training the annual classes, carried out French occupation duties, safeguarded peace and order in the homeland and North Africa, and satisfactorily maintained the Expeditionary Corps.

Everyone recognizes the fact that reserves, organized around a nucleus consisting of the Regular Army, constitute the basic element of a well-organized system of national defense. We are accused of neglecting this important part of our defense. It is quite evident, however, that an immediate resumption of the training of our reserves, as they were trained before 1939, would result in a further increase in the military budget.

Nevertheless, the number of trained reserves grows with the discharge of each annual class. Under the voluntary cadre training program in 1948, 7,000 reserve students were trained in the training centers and 5,000 more took 4-week courses.

We believe that a stable organization of our reserves will be accomplished in 1949. A rational resumption of training will follow a return to the system of compulsory training.

Few realize the efforts required for carrying out these many tasks with the means at our disposal. It is for the nation to define our missions. It is for the nation to reduce them if it considers that the time has come for it. But at least the Army will have the satisfaction of being able to say, "We have done the best we could with what you gave us."

In the care of matériel, for example, we have exceeded by several years the usual limits of employment in the American army. This has been accomplished by the maintenance performed by our repair shops, our personnel, and the troops employing the matériel. There is no foolishness about this. Good care of matériel enables us to train our units, and also it shows the seriousness and the economical spirit of our troops.

We always return, therefore, to the same center of interest: training, officer procurement, and programs. Here, we see

still more difficulties which hinder our work. These difficulties are as follows:

1. Instability of forces due to uncertain discharge and recall measures.

2. Under-strength in the lower units due to insufficient matériel and to transferring cadres into the Expeditionary Corps.

3. An excess of administrative offices which the lower units must support, and a super-abundance of red tape.

Practical measures have been adopted for correcting these difficulties. In the general plans, a regrouping operation is expected to lead to a revival of the regimental principle. This will result in a concentration of labor and considerable lightening of heavy administrative burdens.

The General Staff is working hard to reduce the burdens in this field. A small example of this is the simplification of the individual indexing of recruits. A systematic effort is being made toward greater efficiency in the central administration, not only for economy but also for saving energy and time.

All this work is progressing slowly and ought to bear fruit and make its effects felt in the troop units. In the final analysis, it is the unit about which we are most concerned. The best part of the military effort is directed toward the units. Since we are concerned here with the human element, I wish to devote some special words on the situation of our units as regards material and morale factors.

Personal Problems

In the past, those of the military profession have never been very rich. The majority has engaged in the career somewhat as though entering a religious order, taking the vow of poverty. Certain fortunate individuals had a personal fortune to supplement their modest pay. On the whole, however, the pay sufficed to protect families from want and distress.

Unfortunately, matters are entirely different today. Pay levels have not followed the constant increases in the cost of living. Equalizing raises have not been obtained. As a matter of fact, military personnel share the unfortunate fate of all members of the public services.

This being the case, the inclusion of military pay scales in a general government pay plan is a guarantee of deriving benefits in the future from the united efforts of the public service federations and of one day achieving a decent standard of living.

Already, the application of social security, which has been so strongly requested by military personnel in general, has been obtained.

Summary

Thus, a few positive gains have been made in re-evaluating the French military profession. Once again, we must learn to wait. The French Army leaders should not be accused of being indifferent to these problems. Beware of the temptation toward bitterness.

If we are inclined to become defiant and decide to abandon the military profession, we should put ourselves in the place of many of our comrades. In an obscure and silent fight, far from their loved ones, deprived of the support of a strong public opinion, and without respite or decisive successes, they have devoted themselves for months and years to the defense of the French Union.

June 1950

Unless each officer and noncommissioned officer has capabilities greatly in excess of the responsibility he holds, he is basically an unprofitable part of a military machine.

General Omar N. Bradley

Meteorology in War

Digested by the MILITARY REVIEW from an article by Sir Nelson Johnson in the "Journal of the Royal United Service Institution" (Great Britain) May 1949.

VISIBILITY is often the most important weather element. Even in these days of radio and radar aids, good visibility is of paramount importance to military aviation. It is necessary for locating a target as well as for facilitating the landing of aircraft on return to their bases. The significance of good visibility in naval operations, and conversely, the tactical employment of bad visibility, are fully recognized in naval staff circles. In the case of military operations on land, visibility can play a decisive part, and it is suggested that there is scope for a wider tactical application of visibility than has been made in the past.

Next in importance to visibility, perhaps, comes cloud, which may affect the operations of all three services not only by the amount of cloud in the sky, but also by the height of the cloud base above the ground or sea.

Third on the list comes wind—both speed and direction. It may be the surface wind in the case of laying a smoke screen, or it may be the wind aloft in the case of navigating aircraft or correcting a trajectory for the gunner.

There are many other meteorological elements which have to be taken into account. From the Royal Air Force point of view, there are the factors of ice accretion, the violent turbulence which occurs in certain clouds which may affect the safety of the aircraft, and the humidity of the upper atmosphere which may determine whether the photo-reconnaissance aircraft is liable to produce a "condensation trail" and advertise itself to the enemy.

The military commander in the field may likewise have to take temperature into account, or rainfall, since with certain kinds of soil it may profoundly affect the performance of his vehicles.

The paramount importance of snow must also be remembered. Its relatively infrequent occurrence in Western Europe tends to obscure its potential importance, but there are possible theaters of war in which snow may be by far the most significant meteorological element for the military commander.

In the case of a combined operation, the commander in chief is confronted with the effect of the weather upon all arms. Some of the requirements may be conflicting. A light wind for parachute troops may involve the risk of early morning fog, which would impede the movement of other arms. In such cases, the advice of an experienced meteorological officer is essential to the commander in chief, both in the planning stage and also in conducting the actual operation.

Meteorology and Planning

It is difficult to overemphasize the importance of bringing the meteorologist into consultation right at the start of the planning of an operation. This applies equally to staff college exercises in time of peace and to actual operations in war.

In addition to indicating the combinations of weather elements which are possible and those which are impossible, the meteorological adviser can provide statistics on the frequency of occurrence of various weather elements taken either individually or in combination. This information is, of course, specific to the theater of operations and the time of year under consideration.

An illustration of the kind of information that can be given is the question of rainfall in Tunisia, which may profoundly

affect the performance of vehicles. The meteorologist will tell you that, on the average, the wettest month in Tunisia is December and the driest is July. He will also tell you that the average rainfall in Tunis for these 2 months is 2.4 inches and 0.1 inches respectively. But, although these are the average values, the actual rainfall for these months in any particular year may differ considerably from the average. The meteorologist, accordingly, works out the chances of the rainfall differing from the average, by any desired amount. For example, he will tell you that for December the chances are about 3 to 1 against the rainfall being less than half the average, and about 10 to 1 against the rainfall exceeding twice the average. Similar information can be given for any month and for any meteorological element. For example, it may be desired to know the chances of getting visibility less than a mile, or a combination of light wind (for landing) with clear sky (for air cover).

The meteorologist can provide the answers to all these questions and many more like them. It takes time to carry out the necessary analysis, so the meteorologist must be given due warning. Although it is not yet possible to predict the weather which will occur in a particular month next year, the type of information just referred to will enable the planner to lay his plans with the greatest chance of success, and it will prevent him from basing his plans upon assumed conditions that cannot occur.

The correct procedure is for the planner to discuss the outline of his plan with the meteorologist right from the start. It must be a personal discussion and not merely a request in a written memo for certain specified meteorological statistics. It is always possible that some aspect may present itself to the meteorologist which is vital to the operation, but which would not be obvious to the planner no matter how many statistics he was given.

Technical Aids to Forecasting

To make a weather forecast, it is necessary to construct a synoptic chart. For forecasting in Western Europe, such a chart may extend from the Ural Mountains to halfway across the Atlantic. Since weather travels, broadly speaking, from west to east, reports from the Atlantic are the most important on our chart. In peace, these reports are supplied by ships, but on the outbreak of war, ships have to maintain radio silence. In an attempt to obtain reports from the Atlantic, the Germans made floating buoys which could be placed in the Atlantic Ocean by submarines. The casing of the buoy consisted of a steel tube about 30 feet long and 20 inches in diameter, surmounted by a tubular aerial some 25 feet high. Meteorological elements, carried inside the casing, measured barometric pressure, air temperature, and sea temperature, and the readings were sent out automatically by radio every 6 hours.

While ingenious, instruments of this type suffer from the fact that they do not give the information which would be of greatest value to the forecaster—the state of the sky, wind direction, and speed. The buoy has the further disadvantage that its position is constantly changing.

Other methods were employed by the British to obtain weather reports from the sea areas. At first, weather reporting ships were sent out, but with the intensification of the German submarine campaign, this method was abandoned. Our second method of getting reports from the sea areas was by means of aircraft specially provided and equipped to carry out weather reconnaissance. The Atlantic Ocean was covered by several routes, including one emanating from Iceland. Another route ran 700 miles northwards from the Shetland Islands, while yet another route lay over the North Sea. Some of these flights are still in operation. The flights were planned to secure observations

both near sea level and at high levels. The outward flight was normally made at about 1,500 feet above the sea, with descents every 250 miles to obtain a pressure reading near sea level. At the outward end of the track, temperature and humidity observations were made during a spiral climb to about 18,000 feet. The aircraft returned halfway to its base at this height and then descended to 1,500 feet again, thus giving the vertical distribution of temperature and humidity at the half-way position. Each of these long flights of about 1,500 miles was made every 12 hours—one sortie by day and one by night. For this duty, Halifax aircraft were provided by the RAF, and specially trained meteorologists were carried to make the observations.

The instrumental equipment included dry and wet bulb thermometers, a special aneroid barometer, and a radio-altimeter. Noninstrumental observations were made of cloud, visibility, precipitation, sea disturbance, and swell. Wind speed and direction were derived from the drift of the aircraft.

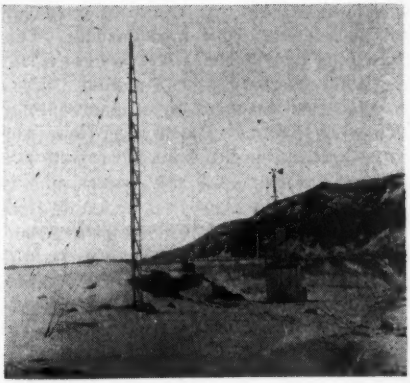
In addition to these Halifaxes which flew on fixed courses at regular times, other aircraft were used for making weather reconnaissances in connection with specific operations. Most of these flights were undertaken for the benefit of Bomber Command. The route chosen did not necessarily lead to the proposed target; the aim was frequently to secure information about the weather, and particularly the cloud, which was moving towards the target and likely to be there at the time of the projected raid. High-speed aircraft of the Spitfire type, operating at great heights, were used for this purpose.

Another method that was developed for obtaining meteorological information affords an illustration of turning to advantage something that is normally a nuisance. The loud cracks or "atmospherics" which are at times heard on every radio receiving set are produced by lightning flashes, sometimes several hundred miles away. Some years before the war, Sir Robert Watson-Watt had shown that the location of a lightning flash could be fixed by observing its apparent bearing from the two ends of a measured baseline. A method was thus at hand for ascertaining the existence and location of distant thunderstorms. The method would show, for example, when there were thunderstorms over Germany or on any part of the route to be taken by RAF aircraft. Since thunderstorms are also frequently associated with the cold fronts of depressions, here was a means of obtaining information about depressions and fronts approaching from the Atlantic.

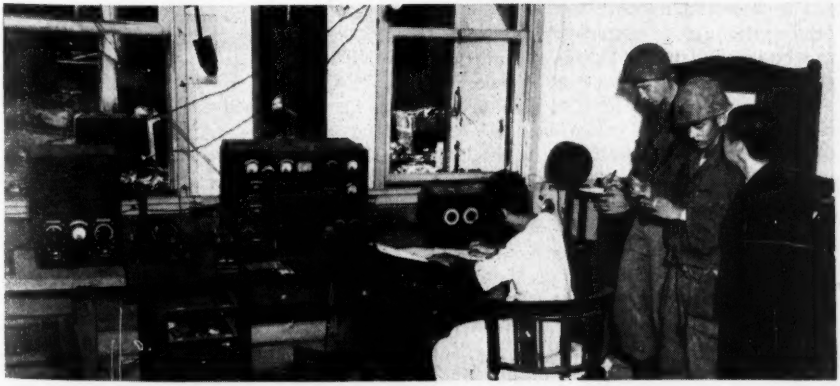
The extensive use of aircraft during the war made it necessary to obtain continuous and accurate information about the winds aloft. The prewar methods of "following" a pilot balloon by means of a theodolite is subject to the serious limitation that it fails when the sky is cloudy. In the early days of radar, the possibility of using this technique for wind finding was examined, but at that time the accuracy was not sufficient. The meteorologist, in collaboration with the National Physical Laboratory, therefore evolved a method based on radio direction finding, which proved of the greatest value.

In the radar method of wind finding, a balloon about 8 feet diameter is filled with hydrogen so that it rises at a rate of about 1,000 feet a minute. It has suspended beneath it a special radar reflector, made of metallized paper stretched over a light wooden framework—something like a boy's kite. The balloon with its "reflector" is, of course, carried by the wind, and by tracking them by radar we obtain the wind speed and direction all the way up to 60,000 feet within an hour—cloud or no cloud.

But it is not sufficient merely to measure the wind aloft as it happens to be at the



In both the planning and operational stages of warfare, the work of the meteorologist is of great importance to all the services. Weather observations made at widely scattered points provide much of the information which the meteorologist can apply to military operations. Above, a weather station at Sharjah, Iran, in May 1945. Right, an automatic weather station which was in operation in the Arctic wastes of Greenland during the latter part of 1943. Below, the transmitter and receiver at the weather station at Naze, Japan, in operation when occupation troops entered the country in 1945.—US Army photos.



moment. To meet the needs of aviation, it is necessary to forecast what the wind and the weather at these heights will be in 12 or 24 hours' time. This can be done only by constructing synoptic charts for these levels similar to the ground level charts with which we are all familiar. The approximate levels for which upper air charts are generally drawn are 10,000 feet, 18,000 feet, and 30,000 feet. These upper air charts not only permit forecasts being made of the conditions aloft, but they assist in the making of accurate forecasts of the weather to be expected at the ground.

To measure the pressure, temperature, and humidity aloft, the meteorologist uses an instrument called a radiosonde. This ingenious instrument, which weighs about 2 pounds, is sent up on a similar balloon to that used to carry the radar reflector for wind finding. Usually, in fact, the same balloon carries both radar reflector and radiosonde. As the radiosonde is borne aloft, it measures the pressure, temperature, and humidity of the air continuously, and automatically signals the readings to the observer on the ground, who tunes his wireless set to pick up the signals.

Meteorological Organization in War

The first requirement in a forecasting organization is a center for the collection and digestion of the technical information which these aids provide. A selection of the basic observations is then broadcast to all operational meteorological units, together with the result of the analysis made by the center. This "derived" information includes the location of high and low pressure systems and the positioning of the associated warm and cold fronts. It also includes a prediction of what the weather chart will look like in 12 or 24 hours' time. This is done not only in respect of ground level but also for one or more selected levels in the upper air. The advice issued by the center gives a general appreciation of the meteorological situation and a verbal forecast of the movements and developments that are expected to occur.

By this means, the meteorological units with service formations are supplied with the essence of the meteorological situation as seen by the experts at the center, who also have at their disposal more information than it is possible to issue to every unit in the field. It also enables the units in the field to be kept small.

The information issued by the center is of a general character, and it becomes the duty of the meteorological units at formations to apply this knowledge to their special problems and to work out the detailed forecasts for the particular operations for which they are responsible for giving meteorological advice. To illustrate how this is done in practice, let us take the case of Bomber Command of the Royal Air Force. At the command headquarters, the chief meteorological officer has his forecasting unit which is linked to the main center and keeps him continuously informed as to the meteorological situation. At each group headquarters, there is a senior meteorological officer with a similar forecasting unit, and at each operational station there are meteorological briefing officers with assistants who maintain a continuous sequence of synoptic charts.

On the basis of the information given by his chief meteorological officer first thing in the morning, the air commander selects his target for the following night. The chief meteorological officer immediately arranges a "telephone conference" with the senior meteorological officers at all the group headquarters, and including the chief forecaster at the main forecasting center. The meteorological situation and the anticipated developments are discussed in detail and an agreed forecast is decided upon. By this means, not only

are the knowledge and opinion of many experts brought to bear upon the problem, but it insures that the same technical advice is given to the commander in chief and all his group commanders. A second telephone conference is held later to confirm or amend the previous agreed forecast. The senior meteorological officers at the groups then inform the meteorological briefing officers at each airfield of the agreed forecast, so that all captains of aircraft and their navigators receive the fully coordinated advice of the Meteorological Service.

The basic principle of the "agreed forecast" is a very important one, and commanders should always be ready to make available to their meteorological advisers the communications facilities which are necessary for securing "agreed forecasts." The provision of adequate signals facilities is vital to the meteorologist. Movement and development in the meteorological situation are constantly taking place, and the meteorological adviser cannot perform his task unless he is kept continuously supplied with the reports which constitute the raw material with which he works.

The Future

The trend of military aviation is in the direction of greater speed and greater operating heights. At the enormous speeds which are now becoming possible, weather conditions become more critical. The meteorologist must aim at providing forecasts of increased accuracy, and it is also clear that he will be required to forecast the conditions at greater heights than in the past. If long-range rockets are used, the heights to which meteorological information is required will be greater still.

The meteorologist must also expect to be asked to forecast farther ahead than the 24 hours which is his present normal range. Research to this end is in progress both here and in other countries, but it would be wrong to hold out any hope of an early prospect of always being able to forecast developments more than a few days ahead. Even if regular forecasts for 3 or 4 days ahead become possible, the predictions are often likely to be in broad outline and not in detail. There is at present no prospect of being able to forecast weeks or months ahead.

The demand by the services for information about the conditions in the upper atmosphere coincides with what the meteorologist wants for the scientific study of his subject. It is now recognized that observations made at ground level will not take us very far and that a full understanding of the events taking place in the atmosphere can be looked for only by a three dimensional approach to the problem.

Although the meteorologist has still much to learn, his present knowledge can be of great assistance to the services. He is anxious to give them all the help he can, both in the planning and in the operational stage.

The Influence of Modern Techniques of War on Strategy

Digested by the MILITARY REVIEW from an article by "Aquila" in "The Royal Air Force Quarterly" (Great Britain) January 1949.

The Aim in War

THE strongest human instinct is that of self-preservation. It has influenced the formation of society from the earliest times, causing families to unite within the stronger defensive framework of the tribe, and tribes to come together in nations. Indeed, the collective security derived from national cohesion is the foundation stone upon which the political, economic, and military organization of a country is built.

War is a continuation of foreign policy. For Britain, it is the last resort of national policy as a result of a threat to the Commonwealth's security, or in fulfillment of a covenant to which it is party. Once war has begun, the Commonwealth aim will be to impose its will upon the enemy as soon as possible. Broadly, there will be two aspects to our war aims, defensive and offensive. In our particular position, we might tabulate our war aims as follows:

1. To maintain the integrity of our Commonwealth peoples and territories.

2. To secure the sources of our Commonwealth war potential.

3. To develop the offensive action by which alone the enemy may be overwhelmed.

The strength of the Commonwealth is widely dispersed, but its most vital territory is Britain herself. This is on account of the large proportion of the population which is to be found there, and the even greater proportion of industrial output of which she is capable. Moreover, she is situated more closely to our potential enemies. As a result, Britain must inevitably be the main base of Commonwealth operations. At the same time, she is the most difficult portion of the Commonwealth to defend. Unless we have strong allies, it is probably still true that without Britain the Commonwealth is fatally weakened. It might be possible for the Commonwealth as a whole to survive a war in certain circumstances if one smaller portion of the Commonwealth were temporarily overrun by the enemy.

However, Britain has long been an industrial nation dependent upon the many areas in the world from which she draws her raw materials. No nation is as dependent upon trade for its very survival, not only in war-making materials but also in food for the people. Thus, the defense of Britain involves also the defense of many outlying territories covering the Far East, Middle East, Africa, and the West Indies. Not only this, but she is as dependent upon the friendship of other nations for vital commodities. Thus, the security of the Commonwealth is intimately bound up with her relations with many other nations. These problems lie in the sphere of foreign policy. In order to derive the benefit of the materials which she draws from these many diverse parts of the world, she must see to it that her lines of communication across the sea are secured. We have, therefore, a far-reaching and complex problem in assuring the security of our main base.

No war can be won decisively except by taking the offensive. Assuming, therefore, that our aim cannot be achieved by the limited objective of maintaining our defensive integrity, we must look to the means of prosecuting the offensive against our enemy. This may require the establishment of military bases and the joint effort of all our war-making potential. Our defensive requirement for securing the freedom of the seas has also given us in the past a most potent means by which to develop our offensive against our enemies, especially if they have been sea-

board nations. Thus, blockade by sea has hitherto been our main offensive weapon.

Major Influences on Strategy

The major influences on strategy may perhaps be summed up under the two broad headings of geography and the population of any particular area.

Any nation whose land frontiers adjoin those of another power must maintain the land forces required to defend it. Any country which borders on the sea alone must trust to the sea for its security. Where a nation's war potential depends upon sources of supply beyond its immediate territory, it will wish to control the communications to them. Where these communications are overland, there will evidently be a desire to extend the means of controlling these communications into the territory of another, and this will give rise to conflict. Where these communications are by sea, no such conflict will necessarily arise, for there will be no encroachment upon the sovereign territory of another nation.

The shape of frontiers will give certain advantages to some nations. Where the frontier forms a salient into another's territory, the one nation may be able to divide the armies on the frontier of another. And on the other hand, where there is a re-entrant, a nation may be able to squeeze out or cut off the army of the other. Seaboard nations will have to rely upon their command of the sea for defense. If they cannot do this, then the shape and length of their coast will influence the effectiveness of their defenses. A long coast without harbors will be difficult to defend and will require large and dispersed forces.

The position of one country in relation to another and its vital trade routes will also influence the strategic integrity of a nation. For instance, a nation which commands the passes through a range of mountains will be able to take toll from international traders and will be well situated to cut off the essential supplies of another in time of war. At sea, the nation which controls the straits is in a similarly powerful position. Moreover, a nation which can work along internal lines of communication can speedily effect concentration, while the nation working along external communications is at a disadvantage. On the other hand, provided a nation retains command of the sea, it may be an advantage to work on external communications. By threatening a long coastline, the nation with external communications may force a nation that has internal communications to disperse its defenses around a perimeter.

It is clear that nations which are on opposite sides of a common enemy may be defeated in detail. A nation holding a central position may, on the other hand, force the enemy to split his forces. For instance, the position of Britain allows her to split the seapower of the Continent by denying the passage of the Channel. By our position at Gibraltar, the seapower of Spain is split, and this is also true of France. The possession of Malta allows the Italian seapower to be split. The seapower of Russia may also be divided between the east and the west.

Mountains, rivers, sheltered waters, and the extent of a territory will all have their bearing on the strategic position of a country. In particular, today, depth of territory is important for the deployment of air forces and organization of effective air defense. In Russia, it was largely the vastness of her territories and the weather which brought defeat upon both Napoleon and Hitler.

Another major influence upon strategy is the character and number of a people. If there are large numbers of agricultural people of indifferent industrial skill, then the strategy which that nation must adopt will tend to depend on mass tactics and the absorption capacity of her great terri-

tories. On the other hand, a small, highly industrialized nation will depend more upon technical methods of war. A nation which depends upon the sea for its trade and defense will have large reserves of maritime people and shipping and the ability and means to construct and the skill to handle ships. Few countries can hope to depend as much upon the air for trade as they have upon the sea. Those who by distance and commitment are most encouraged to take to the air will build up a reserve of industrial skill which will prove to be a strategic factor in time of war.

Depending upon the particular situation in which a country may be placed, the government should appreciate the vital means by which its defenses can be assured. It should then encourage the peacetime pursuits of the nation in such a way that in war they may be a source of strength. In highly developed civilizations, it will be essential to maintain certain forms of industry. In continental powers, the emphasis will be upon the needs of armies. In seaboard nations, the emphasis may be on navies. Today, it may be that governments should pay particular attention to the aircraft industry and the training of its manpower.

Techniques of War

Throughout history, there has been constant development in the instruments of war, each giving rise to new strategies and tactics. The disadvantages of the Greek phalanx and its "hedge of spears," gave rise to the more open order of the Roman legion. This allowed greater mobility and, in particular, the legion could change direction at short notice to face a flank attack. It was largely the influence of the foreign elements in the Roman army which caused the development of cavalry. Later, during the dark and middle ages, the cavalry arm continued to be the predominant weapon of war. During the Crusades, the heavy mailed cavalry of the West was no match for the light and swifter cavalry of the Turks armed with bows. As a result, the ruling notion among the commanders of the West was to allow the light forces to become engaged and then to destroy them by superior weight and weapons before they could extricate themselves. During the campaigns of Edward III, the Black Prince, and Henry V in France, the English were equipped with the longbow, which proved to be a decisive weapon. However, their tactics were defensive. They formed their position and awaited the enemy's attack. At Crécy, Poitiers, and Agincourt, the heavily armored French cavalry dismounted and attacked on foot, thereby dispensing with their qualities of speed and mobility. By the time they had reached the English lines, they were out of breath and were easily defeated. Once again, the infantry became the center of gravity of a battle, and the cavalry was used to overrun the enemy flank when he became inextricably committed. The development of the cannon and, later, the musket put further restrictions upon the employment of cavalry. However, they were used to deliver the *coup de grace* throughout the days of Marlborough and Frederick, and also during the Napoleonic wars a century later.

In recent times, the development of the machine gun created a formidable problem for the infantry, and this gave rise to the tank. The technique of war on land has swayed back and forth . . . now using this weapon, and now that. Invariably the right use has proved to be a careful combination of all weapons.

At sea, fighting took place during Roman times either by ramming or boarding. It was largely a matter of fighting a land battle with soldiers at sea. It was not until Henry VIII ordered guns placed in his ships that fleet actions in anything approaching the more recent sense took place. Throughout the Spanish, Dutch, and French wars from the sixteenth cen-

tury until the introduction of the dreadnought, naval warfare became highly developed. The idea of fighting a naval action at gun range was adopted by Drake against the Spaniards, who still thought of naval warfare in terms of a land battle at sea. By Nelson's day, the technique was perfected. With the introduction of steam and armor, naval tactics underwent many changes. During this century, we have seen great fleets composed of battleships, cruisers, and destroyers.

Early in this century, the submarine was introduced and this enabled a power, which was not strong enough to command the seas, to conduct a *guerre de course* against our vital lines of communication. Their operations could be carried on in widely dispersed areas, and there was little answer except to remain on the defensive. In fact, it was a covert form of warfare, in which the initiative lay inherently with the submarine. The latest weapon to be introduced into sea warfare is the aircraft carrier. It has the dual role of commanding the air space over the fleet or shipping at sea, and of extending the range and hitting power of the navy. In effect, anything in the nature of main fleet actions may now be deemed to be miniature air battles using advanced seagoing airfields.

In the air, balloons were first used in the American civil war and by ourselves in South Africa. Serious aviation was not developed until World War I, when it began as an adjunct to armies and navies, largely for reconnaissance. As the range of aircraft was increased, and as they were equipped with weapons and bombs, fighting in the air, initially in the quest for information, and bombing operations came into being. During World War II, we saw the great air armadas over Europe, and we have seen airpower developed to a point where it has become the first line of defense of our country.

Man is common to the use of all techniques of war, as indeed are the precepts of strategy. It is noticeable throughout the history of war that as one or another technique is developed, there is a tendency to rely upon it too much until it finally finds its level as an efficient complement to other techniques. For instance, cavalry was used in many different fashions—as a fluid force operated around a stable infantry pivot, by themselves, and dismounted as heavily armored infantrymen. Finally, their use became stabilized as a proper complement to infantry and artillery. We have seen the same process at work in the use of tanks during our own time.

At sea, we have seen a somewhat similar development in the use of various fleet units, including today the submarine and the aircraft carrier. It is largely a question of gaging the capabilities and limitations of each weapon and finding a compromise which will most effectively achieve the aim at any particular moment.

Thus, when we come to aircraft, we find that their capabilities are potentially far-reaching. It is difficult to bring about a compromise in pursuit of the former aims of sea and land warfare which does not at the same time set limits upon some of the most important potentialities of this weapon. In this case, the range alone extends so far beyond surface combat that the major part of war in the air is conducted in a separate arena of operations.

At the same time, the evident advantages of these weapons when used in the surface battle make them an essential ingredient in all surface warfare. By character, however, the potentialities of aircraft, great as they may be, are least effectively employed on battlefields or against small targets. This is largely due to the inherent inaccuracy of bombing and the difficulties of locating small and dispersed targets. Moreover, the destructive capacity of the most powerful aircraft weapons

is largely wasted against such targets on a battlefield. It is a matter of reconciling the capabilities of these new weapons to the possible tasks open to them in the prosecution of war.

As a result of their main virtue of being able to move over land and sea, their great range and the destructive power of the weapons they carry, aircraft weapons can be used more effectively beyond the sphere of former battlefields. And so it is that their operations have become a part of the higher aims of war. Once again, however, it is important not to lose sight of the lessons of history. We must insure that air operations are most effectively coordinated with the employment of all our fighting potential including our surface forces, even though this coordination may not necessarily be upon the immediate battlefield.

In view of the recent development of weapons of mass destruction, the use of air forces in the realm of the higher aims of war is likely to become of very great importance to a nation. The tactical and technical limitations of aircraft suggest that air warfare is unlikely to supersede other forms of warfare altogether. It is probable, however, that it will increasingly become the main instrument of national defense and offense.

Defense Against Air-Landed Forces

Translated and digested by the MILITARY REVIEW from an article by Major General Henry Peyron in "Ny Militär Tidskrift" (Sweden) No. 4, 1949.

IF AN air-transported enemy succeeds in landing his forces and in wiping out the local defense forces, his first objective has been accomplished. Within a short time, he can be ready for extended action.

The defender should take action against such an enemy as quickly as possible. An attack must be made to regain control of the landing area. Special, powerful reserves are required for this type of action, but the attack must not be delayed while waiting for reserves. The attack should be launched against the enemy before he has had time to consolidate his positions.

And now we come to the important question: Will the reserves be able to reach the landing area in time? This depends on where the area is. It is possible that the reserves in question will find themselves in a favorable position relative to the landing area. In view of the great expanse of territory available to the attacker in comparison with the strength of the defending forces, and in view of an air-transported enemy's freedom in selecting his jump-off positions for ground operations, the odds appear even that the reserves will be a considerable distance from the landing area. In this case, the reserves must be highly mobile if they are to arrive in time.

Ground Defense

In case the defender does not have mobile forces at his disposal, it may often seem useless to set aside certain reserves for action against air-landed forces, as there will be little prospect of their being able to intervene in time. In such a case, the defender will not be able to use this effective method of imposing his will on the attacker. In order to do the enemy the greatest possible injury, however, the defender may resort to a different method of ground defense. He may disperse all his formations in the vicinity of probable landing areas with concentrations of forces in certain critical areas. These troops will oppose the landing operations when they are in their most vulnerable

stage. To the extent that defense forces in certain areas are not bound by enemy attacks or operations, it is expected that at least part of them can be released for employment in other critical areas. Generally, everything is based on the possibility of winning certain initial successes, at the same time disregarding or reducing possibilities for action against the enemy in subsequent phases.

Without doubt, the arguments for such a ground defense are good. There are also arguments against this principle. In this type of defense, the defender plays practically all his cards at the very beginning. As stated above, it is expected that defense forces in areas that are not under attack will be employed as reserves. But it is uncertain to what extent the enemy will leave any particular area undisturbed. There are reasons for supposing that at the same time he directs his main effort against certain areas he will also attack other areas in order to immobilize defense forces located there or to mislead the defense command with regard to his intentions. The forces in these minor attack areas will be more or less occupied and will suffer losses, even though they might repel the attack. Also, the defenders cannot be sure that the enemy will not renew his attack after once being repulsed. In addition, reassembling a formation which has been deployed over a certain area requires time, even though the formation may have been extensively trained in this maneuver. Therefore, it seems overly optimistic for the defense to depend on the support of forces which have not been attacked. Yet no other course is possible. Under these circumstances, a defense commander can find himself devoid of any opportunity for taking action.

In addition, the enemy probably would precede his landing operation by bombing attacks on those places where he expects defense forces to be grouped, or against terrain in the vicinity of the landing area. Thus, forces grouped in the immediate vicinity of a landing area would be exposed to punishment unless well protected by defense installations.

Use of Mobile Formations

Technical advances in military equipment are causing changes in tactical methods. It has always been regarded as fitting that the chief should have powerful forces at his disposal for achieving decisive successes or for clearing up critical situations. According to foreign views, the defender ought to surround and destroy the air-landed enemy with the help of mobile formations.

The belief that a fixed ground defense is the only recourse is hard to dismiss. It would seem well, however, to get away from such a strict defense policy as much as possible and make use of defense principles that would give the commander greater operational freedom. In order that this may be done, the defender must have mobile, rapid formations at his disposal. Proponents of a fixed defense also point to the fact that the possession of mobile forces makes it possible to group defense forces more in accordance with the requirements of frontier and coastal defense. On this basis, it would appear incorrect to tie down any existing mobile formations to local, purely ground defense missions. Principally, they ought to be employed as reserves. Above all, this is applicable to armored forces. With regard to mobile formations needed for powerful action against an air-landed enemy, armored forces are in a class by themselves and Sweden does not have enough of such forces. This is another reason why they should be used properly and not tied down. Motor-transported troops may be the most rapid over roads and highways, but they are also the most vulnerable, especially from the air. For longer movements, motor transportation is indispensable if the forces are to reach the desired

place in time. The same speed cannot be attained when horses or bicycles are used, but enemy aviation is not so effective against them. Furthermore, the speed of horses and bicycles is sufficient for short tactical movements which often have to be carried out. There probably will never be an abundance of cavalry troops, but those which exist could very likely adapt themselves to the missions in question. Bicycle transportation could be developed extensively. Bicycle formations are flexible, like cavalry, and capable of movements with comparative ease. The transportation costs are low. The vehicles are convenient and require little or no servicing.

All arguments point toward an organization that will give Swedish field forces the greatest possible mobility and speed. The possibility of Sweden holding its own against air-landed forces depends on the degree of mobility possessed by these field forces.

Airborne Forces

Digested by the MILITARY REVIEW from an article by Major General A. J. H. Cassels in the "Journal of the Royal United Service Institution" (Great Britain) February 1949.

AIRBORNE forces are those formations and units which are specially trained and in some respects specially equipped to be delivered direct to battle by air. They and their equipment will initially be landed by parachute or glider and they must be prepared to fight immediately on landing.

The term does not include what we call air-transported forces. These are troops who are carried from A to B in a powered aircraft and are landed in that aircraft. Although they may land in the theater of operations or even the battle zone itself, they are not expected to fight immediately and in fact may not even be tactically loaded.

Characteristics and Limitations

There are many factors to consider when deciding on the numbers of airborne forces it is desirable to have and on how to use them.

The first is the "potential threat." The mere existence of airborne forces constitutes an ever-present threat to any enemy. He does not know when or where they are going to be used and this forces him to disperse his forces to guard many places which otherwise he could safely leave unguarded. In 1940, our meager resources were spread all over the United Kingdom to protect vital areas against German parachute attack. This was done at a time when we could ill afford such dispersion. Therefore, it seems clear that the possession of airborne forces is, in itself, a contribution towards weakening the enemy, even without actually using them.

The next factor to consider is the capabilities of an airborne formation. The airborne division, for example, is organized on almost exactly the same lines as the infantry division. However, it is impossible, at present, to deliver the heavy equipment and vehicles of the division to battle by air in the assault stage. Therefore, until this equipment is delivered, the division is much weaker than an infantry division. When landed, airborne formations are comparatively immobile and take some time to assemble and get ready to fight in units. They lack firepower and necessarily have small stocks of ammunition. The moral of all this is that airborne formations should not be landed in areas where strong and immediate opposition is expected.

Another factor of great importance is

the weather. This affects both parachutists and gliders, but in different ways. It also affects the aircraft which are dropping or towing them. It is not yet possible for aircraft to locate dropping zones and landing zones accurately in all conditions of weather. Accuracy of drop or landing is most important, and therefore bad weather will prejudice or may postpone the operation. This must be considered in the planning, as a postponement will generally affect many other forces besides the airborne. Two other weather factors must be watched—the wind and clouds. The wind affects the parachutist as, if he is dropped in high wind, his chances of landing safely decrease rapidly. In training, we do not allow drops in wind speeds of over 15 mph. In operations, naturally, one must accept greater risks. As a yardstick, it can be said that if you drop in winds over 25 mph, the chances are that the casualty rate on landing will be too great to allow the unit a fair fighting chance to carry out its job. In this connection, a steady wind is far better than a gusty wind. To give an indication of the shock on landing, it is roughly the equivalent of jumping off the top of a train which is moving at the speed of the wind. Clouds, on the other hand, are a menace to the glider. Unless the glider pilot can see his tug-aircraft, it is extremely difficult for him to keep his correct towing position, with the result that he may crash into the tug or break his tow rope. Therefore, any prolonged flying through clouds is not practical at present, though there are promising methods of overcoming this limitation.

Good meteorological forecasts and flexible planning are necessary when mounting an airborne operation.

The next factor is also somewhat intangible but still real. It is the effect that the dropping of airborne troops has on the enemy's morale. I think it is fair to say that it is out of all proportion to the numbers dropped. There are many examples to show this, but the classic one was at the end of 1944 when the Germans started their offensive in the Ardennes. At that time, it was clear that the Allies had won, or at least nearly won, the war. Our morale was high and we were just getting ready for the final offensive. The Germans included in their offensive the dropping of a few parachutists. I do not believe that these troops accomplished

British Paratrooper.

anything directly. Indirectly, they achieved a great deal. Messages flew in every direction, check posts and local guards were established everywhere between Brussels, Antwerp, and the Ardennes, and even as far back as Paris. To be quite frank, there was considerable alarm and despondency.

We now come to the factor of vulnerability. An airborne operation on anything except a small scale is an air operation of the first magnitude. To

achieve maximum success, it is desirable to drop or land as many troops as possible as quickly as possible. This means that a mass of comparatively slow and unarmored transport aircraft and gliders will be flying in close formations to their target. They are very vulnerable, and their protection en route, while over the dropping and landing zones, and on the return journey is essential. It involves the most detailed planning and absorbs considerable fighter effort. Arrangements must be made not only to defeat the enemy fighters but also to neutralize his *flak*, particularly in the target area. Parachutists, though very difficult to hit in the air, are very vulnerable when they hit the ground and are struggling to get out of their harness, collect their weapons, and find their way to their unit rendezvous. Gliders are, of course, vulnerable all the time until they have discharged their cargo. There are, therefore, two requisites before embarking on an airborne operation. They are: local air superiority, and the neutralization or absence of strong enemy defenses in the landing area.

Another factor to consider when deciding on the number of airborne formations required is that of expense both in manpower, in effort, and in money. In war, money is a secondary consideration, but in peace it plays a big part. Manpower is always scarce, both in peace and war. It is necessary therefore to realize that the training of specialists such as parachutists and glider pilots involves considerable overheads in money and manpower. The aim of the future must be to devise other means of sending soldiers to battle by air and to do away with the individual parachutist and the glider. It is probable that for many years to come we will still need some individual parachutists and gliders for raids or *coup de main* operations. But for normal airborne operations, it is the aim to find other methods. I need not elaborate the advantages that will accrue when we can use any trained infantry formation in the airborne assault.

Employment of Airborne Forces

In general there are four ways of using airborne forces:

1. The strategical or "deep penetration" role.
2. The tactical or "quick link-up" role.
3. Special operations, such as raids.
4. The emergency or "last ditch" role.

The strategical role, as the name implies, involves dropping forces in an area apart from the land battle. The object will vary. It may be to create confusion and panic in the enemy's lines of communication area, or to seize some area which is required as a base for future operations, or to destroy or deny some area to the enemy. In any case, the airborne forces cannot expect to be relieved by their own land forces for some time and, therefore, they can only achieve their objective in areas where the enemy is weak and where his rate or strength of build-up can be equalled by ours. As our build-up will, in such cases, have to be by air, it follows that our forces can never, with present aircraft, be really strong in tanks and heavy equipment. Therefore, the situation must be such that the enemy is equally handicapped or that the country precludes the use of such equipment. The Wingate operations in Burma are good examples of the "deep penetration" role.

The tactical or "quick link-up" role involves using airborne forces in direct support of the main land battle. The drop of the airborne forces is linked closely with the whole plan of the campaign and is so arranged that the ground forces should reach the airborne troops before the enemy can mass sufficient strength to destroy them. The object of such operations will generally be to seize some tactical feature or features which will assist and quicken the over-all offensive, or, indeed, in some cases will allow the offen-

sive to be staged at all. It is clear that in this role the troops will be dropping or landing into areas where the enemy is fairly strong or can be strong quickly. Therefore, one must use airborne forces in reasonably large units and must drop as many as possible simultaneously. Second and third lifts will be very risky and cannot be relied on to achieve a great deal. Similarly, one must arrange for every possible form of fire support to be given to the airborne formations. This is achieved by offensive air support and by the artillery of the main battle units when within range. It is particularly necessary to arrange for enemy *flak* to be neutralized during the approach and landing periods. Normandy, Arnhem, and the Rhine are all good examples of quick link-up operations.

Special operations, such as raids, are comparatively easy to mount provided the information secured by intelligence is adequate. The main problem is generally not in the assault itself but in the evacuation after the raid. A good example is the Bruneval raid. Special Air Service operations, on the other hand, present many problems of their own—probably the main ones are reliable, high-class communications and certain, accurate re-supply. Special operations of all sorts are invaluable when properly coordinated and done under a definite plan.

The last use of airborne forces is what I call emergency operations. By this, I mean dropping airborne forces behind our own lines in a reinforcing role to restore an awkward situation or prevent an enemy breakthrough. This is a most uneconomic method of reinforcing and would clearly only be used as a last resort. The Germans did it in Sicily. Though they did delay the final capture of the island, they did not stop it. It is, perhaps, worth restressing the point that airborne formations, until they link up with their land or sea tail of heavy equipment, are comparatively immobile and weakly armed. Their value must be gaged accordingly.

Airborne forces are perfectly normal formations that are delivered to battle by air instead of by other means. Because they are volunteers and because they will have to fight in more unusual circumstances than most others, they may develop greater individual initiative than some other formations. Apart from this, they are ordinary army formations, and their employment is governed by all the normal major principles of war.

Principles of Employment

There are, however, a few principles which have emerged as a result of lessons learned in the last war. The more important ones are:

1. Do not use airborne forces just for the sake of using them. Remember their characteristics and limitations and use them on a worthwhile task which cannot be done equally well by ground forces.

2. If possible, drop or land your airborne forces in one lift and always arrange for an immediate and automatic re-supply as soon after the assault drop as possible.

3. Try to relieve the airborne forces as soon as possible so that they can equip and prepare for the next operation and restore "the potential threat."

4. The theater commander and his Air Officer Commanding-in-Chief must look well ahead and anticipate the situations where airborne forces can profitably be used. The planning of an airborne operation must, unfortunately, take longer than a normal ground operation. By planning possible tasks well ahead, a great deal of time can be saved.

5. Last, it is vital to bring in the Air Officer Commanding-in-Chief in the theater and his staff at the inception and formulation of any plan to use airborne forces. The airborne formation commander must make his plan in the closest possible conjunction with the commanding officer

of the aircraft that will transport the airborne forces.

Future Developments

There are certain factors which limit or affect the employment of airborne forces.

To recapitulate, these factors are:

1. The inability to drop or land heavy equipment in the assault phase.

2. The somewhat complicated training machinery and effort required to train the individual parachutist and the glider pilot and, as a corollary, the future aim to devise means of doing away with them.

3. The dependence on certain weather conditions for the glider and the dropping of the parachutist.

4. The difficulty of locating defense zones or landing zones accurately in all types of weather or light and therefore dropping or landing troops in the right place.

5. The difficulty of rallying troops quickly to their correct rendezvous whether they are dropped accurately or not.

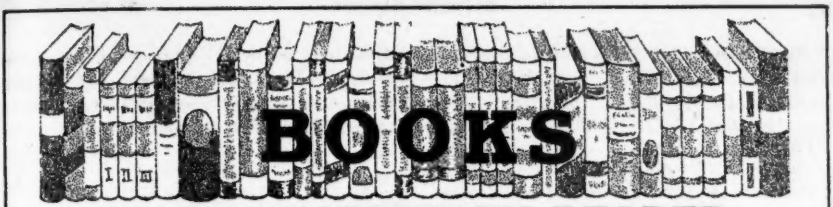
We hope to overcome or reduce these limitations considerably by the development of bigger and better transport aircraft, by the use of the heavy freight container which can be dropped, by the potential value of the heavy-lift helicopter, and by various advances in navigation and directional aids.

The Value of Airborne Forces

There are a number of people who still question the value of having airborne forces and condemn them as an expensive luxury. I hope I have shown that, despite their limitations, airborne forces can, on certain occasions, achieve things which could really be done by no other troops. On other occasions, airborne forces can be a considerable help and save time in a land battle, and they may save innumerable casualties. Immediately after the war, the Chief of the Imperial General Staff asked some of the senior theater commanders who had had experience with airborne forces for their opinion on this point. The opinion was unanimous that no army could be considered modern or complete without an airborne element. The only points I would like to stress are:

1. Airborne forces must not be regarded, nor indeed regard themselves, as a "private army." They are just another type of army formation. At one time, the armored division was regarded as something very special and difficult to understand. The last war cured that. I hope that the airborne division is, and will be, seen in the same light.

2. All commanders and staff officers must understand the limitations and the uses of airborne forces. It is only by this means that full value will be obtained from them. One must get away from the idea that airborne forces are an unwieldy weapon only to be used two or three times in the war and then in enormous mass. They must be regarded as a highly flexible weapon, capable of being used on reasonably short notice.



FOR THE MILITARY READER

THE ROLE OF GENERAL WEYGAND. Conversations With His Son. By Jacques Weygand. 191 Pages. Eyre & Spottiswoode, London. $2.50.

General Weygand had been Commander in Chief of the French Army for 4 years when he stepped down in 1935. But in 1940, when well over 70 years of age, he was recalled to command as France staggered under the German offensive. This book, based on General Weygand's talks with his son, serves to explain many of the major military and political dilemmas which faced France in 1940 and during the subsequent German occupation. Weygand's plans for a double offensive from the north and south against the German corridor to the channel are given in detail. The British feeling that Weygand prematurely considered an armistice with the Germans is countered by the belief that Lord Gort gave only half-hearted support to Weygand's plans for a counteroffensive. Weygand felt that the withdrawal of the British Expeditionary Force from the Continent was itself prematurely contemplated. The latter part of the book deals with Weygand as Minister of Defense in the Vichy government and as Commander in Chief in North Africa. Weygand was later removed by Petain from the North African post, and in 1942 he was arrested by the Gestapo and imprisoned until his liberation in 1945 by the Americans. The introduction to the book is written by Cyril Falls, prominent British writer and military historian.

THE RISE OF RUSSIA IN ASIA. By David J. Dallin. 279 Pages. Yale University Press. New Haven. $5.00.

This volume is a companion work to the author's *Soviet Russia and the Far East*, which dealt with Russia's Far Eastern policies from 1931 to 1948. The present book takes up Russia's policies from their beginning in the middle of the last century and brings them up to 1931. The author finds a dynamic, expansionist element in all Russian policies, regardless of period or type of government in power. Two important distinctions in Russia's present policies, compared to the past, are evident. One is the universality of Communist ideology, and the other is the current lack of another Asiatic power of equal or comparable stature. The combination of these two factors, the author states, merges into "the most formidable expansionist drive in Russia's Far Eastern history."

ROCKETS, GUNS AND TARGETS. Edited by John E. Burchard. 423 Pages. Little, Brown and Company, Boston. $6.00.

This is another volume in the series of histories of the Office of Scientific Research and Development, entitled *Science in World War II*. There are three major parts to the book. The first is concerned with the development of rockets. Part Two tells about the work that was done on the effects produced by weapons through impact and explosion. Part Three deals with investigations on gun design and construction.

OPERATION SANDSTONE. The Story of Joint Task Force Seven. Edited by Clarence H. White. 104 Pages. Infantry Journal Press, Washington, D. C. $3.50.

Operation *Sandstone* was the name given to the tests of atomic weapons which took place during April and May 1948 at Eniwetok Atoll in the Marshall Islands. With the development of new atomic weapons, President Truman in 1947 approved a series of tests. The Joint Chiefs of Staff, as a result, established Joint Task Force Seven on 18 October 1947, with the mission of constructing an atomic energy proving ground for the Atomic Energy Commission at Eniwetok and of assisting the AEC in the first series of tests. The Task Force was placed under the command of Lieutenant General John E. Hull. This book gives the pictorial record of the operation. There is very little text material in the book, but the pictures adequately tell the story. The major part of the volume deals with the assembling of the force, the construction of the proving ground, and representative samples of work performed by the three armed services in preparing for the tests. There are 10 detonation scenes, four of which are reproduced in color.

A REPORT ON RECOVERY PROGRESS AND UNITED STATES AID. By Paul G. Hoffman. 252 Pages. The Economic Cooperation Administration, Washington, D. C.

The administrator of the European Recovery Program describes in this report what was done toward European recovery under the Foreign Assistance Act passed by Congress in 1948. The main subjects developed in the report are: the economic cooperation by participating countries, financing operations, the effect of the ERP on United States economy, the organization of the Economic Cooperation Administration, and communist opposition to the ERP.

BOMBING AND STRATEGY. The Fallacy of Total War. By Admiral Sir Gerald Dickens. 87 Pages. Sampson Low, Marston & Co., Ltd., London. $1.75.

This author's criticism of the British policy and strategy of bombing in World War II is based on four principles. First, the strategists failed to recognize that the German submarine fleet was the principal objective. Second, air warfare lacked, at certain critical times, a singleness of purpose. Third, the concept of "total war" was followed, instead of a policy of restricting the damage of war as much as possible. Fourth, the policies which were adopted served to lengthen the war and to increase its bitterness, thus failing to contribute toward a secure and stable peace. One chapter is devoted to a discussion of the atomic bomb.

AIR POWER CAN DISARM. By J. M. Spaight. 169 Pages. Isaac Pitman & Sons, Ltd., London. $2.75.

J. M. Spaight, a prominent British writer on air subjects, finds in the experience of World War II the answer to many of the questions that have been posed concerning air power. Air power alone did not end the war, he says, but it contributed powerfully to the final result. Germany and Japan alike were brought to a point where victory for them was impossible. Air power virtually disarmed them, he contends. This result was brought about, however, less by the onslaught on cities than by the blows that air power delivered on oil and transportation targets.

THE EVOLUTION OF AMERICAN FOREIGN POLICY. By Dexter Perkins. 181 Pages. Oxford University Press, New York. $2.00.

This book traces the development of American foreign policy from the beginnings of the federal government to the enunciation of the Truman Doctrine.